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OF THE

WORCESTER COUNTY

HORTICULTURAL SOCIETY,

A. D. 1895-96.

Worcester, Mass.
CHARLES HAMILTON, PRINTER.
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CONTENTS.

	Page.
Report of the Secretary, A. D. 1895	5
Report of the Librarian	29
Report of the Treasurer	35
Address by *President* O. B. Hadwen	39
Essay by James Draper	41
Essay by Thomas C. Mendenhall	56
Essay by G. E. Stone	60
Essay by Sarah E. Doyle	69
Essay by E. H. Forbush	76
Essay by Charles Greenwood	82
Essay by Edward O. Orpet	89
Essay by George E. Francis	102

WORCESTER COUNTY
HORTICULTURAL SOCIETY,
A. D. 1895.

ANNUAL REPORT OF THE SECRETARY.

To the Members
of the
WORCESTER COUNTY HORTICULTURAL SOCIETY:

For long years have the Members of this Society seen the name of James Frank Allen enrolled upon its list of Trustees and placed at the head of its Committee on Nomenclature. Yet to how few were his features familiar, or even a memory of his life-long service to our local Horticulture kindly treasured! Confined to his home by physical infirmity for many years, he was deprived of that personal association which had been one of his most cherished enjoyments. But there are some, few enough as it sadly happens, who recall the assiduous devotion that he brought to the definition of variety or species; a task always sufficiently exacting, and one wherein no man may hope to excel who is not inspired with a hearty enthusiasm for science and its precise terminology. In those days we were less fortunate than now in the possession of expert judges, upon whose accuracy of decision we are wont to place such implicit trust. If we could secure a Chairman for our Committees who would assume the burden of writing their Reports, as was then the custom, we were apt to flatter ourselves that we had fulfilled the whole duty of the Horticultural man. But a perfunctory discharge of obligations devolving upon him did not content our

late associate. Facile acquiescence in name or kind would never suffice him, who insisted upon positive determination of class and title in all that was brought before him. He may have been somewhat set in his own opinions; but few men are worth much, whether for themselves or others, who are certain of nothing. It may be said of Mr. Allen that he based his opinions, when challenged, upon the most approved authority, and that the occasions were rare indeed that he did not find ample support in the pages of Downing or Thomas. He grew to be an authority in our local pomology; and now that he has gone, it is fitting that this slight tribute to the unwearied service that he rendered so cheerfully, at our every beck and call, should be awarded by one who was in a position to measure its character and extent. His length of days was protracted far beyond the limits of the psalmist; and therein; as in the case of so many of our prominent associates, if longevity be of itself desirable, Horticulture may be claimed to have been vindicated in its servants.

By the death of John J. Thomas, February 22, A. D. 1895, the number of Honorary Members of this Society is reduced to four. It has ever been a wise practice, in our government, to be strictly guarded in the bestowal of official recognition, and to make no award of substance or honor that could not be amply justified by the manifest merit of its recipient. Whether as a practical pomologist, or as author of text-books that have passed through countless editions as standard authority in Horticultural science, Mr. Thomas was ever the peer of Barry and the Downings, and survived them to take his proper place, unchallenged, at the very head of the Pomologists of America. He valued his connection with this Society as an honor; in his unaffected modesty regarding all as his equals whom congenial tastes united in a common pursuit. It was the privilege of your *Secretary* to hold constant correspondence with Mr. Thomas, and it is but simple justice to acknowledge the patient courtesy with which all letters of inquiry were invariably considered and answered. Judge therefore of the shock when, in reply to a question what was the actual estimate of a

certain variety of pear by Mr. Thomas, his wife informed me that my venerable friend "was not permitted to read, write, nor even to have any one read to him." This, upon Dec. 30, A. D. 1893. For two months transcending a year his existence was prolonged under such grievous disability. It is understood that he had been able, in his latest years, to prepare a new Edition of his elaborate work upon Fruits and their Culture. His life was profitably and well spent in that learning and practice whereof he had such thorough mastery. Let us be grateful that our Society is permitted some legitimate share in his name and fame!

A brief correspondence between the Department of Agriculture at Washington, and your *Secretary* was held while the century was growing old, to which I would not now revert were it not in the public interest to show to "what base use" the gratuitous distribution of seed, conflicting with the legitimate traffic of honest, self-supporting dealers, "may come at last." The whole system cannot but be partial and, if only for that reason, must be wrong, root and branch. In theory it corrupts the moral sense and, when degraded to its usual practice, is destructive of straightforward integrity. The Representative, say from the Fall River District, who commences his career peddling "zigzag corn," likelier than not will seek to "make his" second "calling and election sure" by a modification of the excise upon *spiritus frumenti!* at the demand of men who get a precarious living off "Cattle-Feeding" in Wall street. The notification, which came to hand by way of a New Year's present, as it were, was to the following purport:—

"UNITED STATES DEPARTMENT OF AGRICULTURE,
"WASHINGTON, D. C., 189.

"*To Edward Winslow Lincoln, Esq., Secy. of Wor. Co. Horticultural Society.*

"*Sir:* By request a package of seed is mailed to you today, but may not reach you within several days. The Department wishes to know of its receipt, and asks acknowledgment on postal card.

"Respectfully,

"J. STERLING MORTON,
"*Secretary.*"

You will observe that this letter of advice bore no date, doubtless owing to undue haste in transmitting intelligence of such moment; but the postmark defined plainly enough the close of the year. The answer, stating receipt, &c., is appended:

4: January, 189 .

Hon. J. Sterling Morton, Secretary Dept. of Agriculture.

Sir: I have the honor, in behalf of this Society, to acknowledge the receipt, this day, of seeds, as follows:

One-Half Ounce (½) CABBAGE—Excelsior—Flat Dutch,
" " " (½) CARROT—Short-Horn—Early Scarlet,
" " " (½) CUCUMBER—Extra Early Siberian,
" " " (½) BEET—Early Flat Bassano,
" " " (½) LETTUCE—Golden Ball,
" " " (½) PARSNEP—Hollow-Crown,

Also,

One (1) Gill SWEET CORN—*Zigzag Evergreen.*
" (1) " " PEAS—Blue Peter.

A postal card had been duly received, doubtless intended to prepare us for the benefaction, the magnitude of which is properly appreciated. Pretty much everything in the list has been known for years to our skilful growers of vegetables, who are glad to learn that the Department of Agriculture recognizes their established merits. Of "zig-zag corn" I cannot speak so favorably; the Horticulturists of Worcester County, as a rule, preferring to take theirs straight.

With great respect I have the honor to subscribe myself,

EDWARD WINSLOW LINCOLN,
Secretary.

Since then the months have rolled by, in regular sequence, but no more corn, zig-zag or rectilinear, has been dispensed in homœopathic measure to the Horticulturists of Worcester County. Your *Secretary* was ever dull at the higher algebra. Otherwise he would gladly compute the exact benefit to this great county, having few superiors in the entire Republic, of a gill of seed—the cull and lavish bounty of the Federal Government! Nay,—he would not fear to essay the problem, illumined by the miraculous draught of Scriptural pouts, of how far the ratio of 16 to 1 might be modified, were six (6) ounces of cabbage or carrot seed annually distributed among the market gardeners of this city and vicinity! The columns of the contemporary press,

in late Spring, recorded the bestowal, through our congressmen, of Flower and Field Seeds, by the "sack full," upon local farmers. It speaks well for the fair repute of our members as Florists, Pomologists, or market gardeners, that no such rubbish has been dumped upon their premises, or left to waste as offal for city pigs. Dealers in clean, healthy seed have a right to be guarded from competition that is reckless of consequences and heedless of cost, because backed, itself, by the public treasury! That a great light shall at last become visible in Washington is matter for general rejoicing. When the General Government can confine its functions within their proper sphere of exercise it will be better for all of us who avoid the local almshouse and do not hanker for national dole. The member of this Society who consents to be a recipient of Federal bounty, to the exclusion of his fellows, perpetrates a public wrong and underlies individual reproach. Howsoever brought about, let us be exceedingly glad that this glaring shame is at last to be covered from our gaze! The conclusion of *Secretary* Morton, sustained as he is by a formal opinion of the Attorney General, that it is no part of the legitimate business of the Department of Agriculture to distribute seeds any more than their product, is generally commended by the press that takes special cognizance of seed-time and harvest. A spiteful kick is threatened from a Congressional District in our own Commonwealth, although curious stories are in circulation about those Representative heels and the force of their repulsion. It is not to be denied, if *Panem et Circenses* are to be distributed throughout the Republic, that a very acceptable form of dole in every kitchen might be found in stove polish. Yet the stove itself is but a present convenience, which gas or electricity are likely soon to supplant. Will it not be better for each tub to stand on its own bottom? Each pot to be content with its own hue without blackguarding the kettle? Each granger to earn a living, like his fathers before him, by hoeing his own row!

The display of our Native Flowers, throughout the season just past, has been a most gratifying and marked feature of our Weekly Exhibitions. In this connection

it is an act of simple justice to award the meed of praise that is plainly due to Mr. Arba Pierce, whose rare taste and tireless industry have placed this Society and the whole community under a weight of obligation for an entire generation past. No obstacle has proved insurmountable in his persistent efforts to collect specimens of almost our entire local flora in their season. The ambitious women who aim to describe "Some New England Flowers," signalizing their learning and taste by omission of Lythrum Salicaria, Sabbatia Chloroides, etc., can set no stint for Mr. Pierce. Perchance the water in the swamps wherein he wades is too deep, swamps in which the bicycle finds no pathway,—the bloomer no bottom. To him, at least, fortunately for the repute of our Society, the Flora of New England can never be complete so long as its fairest specimens are left to bloom unseen. There have been—and they might be found among our judges, to whom the Wild-Flower is but a weed, to be left in the fields, unnoticed. Yet, whence do you derive the brilliance and profusion of floriage that is so charming in Conservatory or Green-House! What was their origin? From what source do you trace their evolution? In the light of past experience, shall we call or consider anything despicable, simply because we have been too conceited or lazy to attempt its improvement?

Few, even of our oldest members, can recall our exhibitions, of a generation since, so clearly as to take precise measure of the contrast between them and those which we are latterly holding. It was always our aim to stimulate the higher culture, and to promote the practice of Horticulture by offering substantial rewards for preeminence in the actual growth of every fruit of the soil. Grant that the attendance was seldom commensurate with the merit of the display! The Exhibition was a free-will offering; the whole community might be onlookers, did they choose; and, at any rate, the tables were set as of old, when it became the fashion, if not an imperative necessity, to scour the highways, compelling the very hoodlum and tramp to come in. Now, the display of Flowers, wild or cultivated, forced, or left to grow at their

own sweet will, is so complete, that the judgment of most expert Florists must be invoked that a just award shall settle the relative merits of the various exhibits. The advance towards a thoroughly eclectic exhibition has been steadily onward, without evident check or hindrance. The former unit of superiority is adopted for a present standard of common excellence. The greater or less throngs that crowd our side benches in eager expectation of the bounty that they have got to anticipate,—almost to exact,—from the cultivators of choice specimens of rare varieties are privileged to gaze upon a banquet that never fails. But how little thought do they bestow upon the skill and industry that were required to insure the sequence of bud or blossom! How little do they reck of the cost of it all; of the sleepless vigilance and unending toil; of the watch against excess of heat or the stealthy onset of frost; from any or all of which imminent perils no one can feel sure of exemption; yet escaping which, they are accounted mean unless they make lavish distribution after gratuitous display. Might not guests at our Exhibitions well go down into their pockets before soliciting, as a free gift, flower, or fruit, that have cost so much time and labor?

But dismissing consideration of that mental perversity that would gather where it had not strewn, and which is shameless in its persistent effort to transform a generous display into a custom of promiscuous dole, we are warranted in priding ourselves upon the signal progress which has crowned the aims and efforts of the Society throughout its felicitous existence, but more especially during the past decade. The Rose was always with us; as fragrant in the simple gardens of our mothers as now on those pretentious occasions when the collections of plutocrats become almost oppressive from their sheer magnitude and heavy perfume. Yet, how lately have we acquired all that opulence of floriage which the Orient has yielded for our admiration and delight since first the squadron of Perry cast anchor in the waters of Japan! The pages of an Encyclopædia would be required to do justice to the vast number and rare excellence of plant and shrub that have come to us so easily that we almost seem to have possessed them ever. Forsythia and Weigela, Iris or Lily,

in their manifold forms; Pyrus Malus Parkmanni and Syringa Japonica; how little could our Founders anticipate the floral treasures that should so soon be spread out before them as they gaze in almost speaking likeness from yonder walls! And if in number and variety the gain is so distinct, what may we not likewise claim as to the marked advance of our members in skill and taste of arrangement! Our early equipment has become obsolete; only suitable and serviceable for such jam and litter of Marigold and Zinnia as are heaped together by Societies whose chief care is the accumulation of shekels. We too might display the monkey and parrot! and possibly by so doing earn the bounty of the commonwealth. Yet we have elected, hitherto, to "Advance the Science and promote the Practice of Horticulture;" and, as we measure our past service, wherefrom, because of local rivalry, shall we find occasion or cause to abate jot or tittle from our lofty aspiration? Understand me thoroughly, Horticulturists! as the sciolists of the daily press do not or cannot, either purposely or from deficiency of mental pollen. A hearty laugh is good in its way; and there are proper times when it may be elicited from a double somersault or grotesque buffoonery. Those of us who, aforetime, had a ninepence given us to spend at Cattle Show cannot well take exceptions to the antics and capers which draw plaudits and gate-money in these latter days. But they are not Horticulture! nor Agriculture, it is to be hoped. And, as rivals of the circus, can it be pretended for a moment that such "attractions" are to be classed with the orderly trained display of Bailey or the Ringlings! Still Horticulturists are taxed, in common with other citizens, to raise the bounty which the General Court is fooled to believe goes to advance the better cultivation of our farms! If that is to be the quality of tuition who can wonder that farms are abandoned?

Few can have attended our later Exhibitions,—during the current year especially, but must have observed the decided improvement in the character of flowers, and as well in the grace of their arrangement. A pretty feature, peculiar to our most recent schedule, has been an encouragement of the display, loosely, of the more conspicuous varieties. Thus, for example,

what could look better than Pinks or Roses thrown together in vases without being tied in bunches of customary formal stiffness! It would appear a happy conceit to designate some certain species, or variety, of flowering plant as a *pièce de resistance* for a given day; the whole to be supplemented by what, for lack of a better term, might well be styled floral display. Rose, Iris, Sweet Pea, Hollyhock, Antirrhinum, Gladiolus, Aster, Lilium Speciosum—can you not, from that almost unlimited catalogue of fragrance and beauty select each week such as shall uphold the standard of Floriculture, leaving it discretionary with the judge to recognize signal merit over and beyond the specialty? There are species, perhaps simple varieties, which constitute the main army, so to speak; and there are others, if not so meritorious, yet of such distinctive character as to justify their enrolment among the skirmishers. Wide opportunity for the display of taste in due arrangement; for the apposition of flowers with especial regard to harmony of tints without too violent contrast; is thereby afforded the individual left to his own judgment free from arbitrary restrictions. Such pretty devices as some which charmed the spectator on August 15, for example, cannot soon, nor easily, be forgotten. The entire conception, even if the ideal is imperfectly carried out, is yet a positive step forward, insomuch as it illustrates concrete beauty of the flower itself rather than color whose very brilliance is blurred by its mass. And that mass, not being desirable intrinsically, should not become an object of our bounty.

Throughout our series of Exhibitions, in that era of delirium wherein horticultural ambition aimed to see how large a collection might be accumulated, rather than what should be its quality, we were wont to fill Mechanics and Washburn Halls to overflowing. The gross, unnatural heap of this, that, and the other, blurred the vision and confused the judgment. Living longer, we became wiser. But that which we long since outgrew and therefore discarded, seems to be adopted by our gentle friends—the enemy—over on Agricultural Street, who assimilate their prey in bulk, after it has been crushed in the folds of their

annual constriction. All the dollars that can be gathered in, as the result of exhibitions chiefly remarkable for hugeness, can never compensate for the absence of that specific instruction that is rendered wholly impossible by the crowd and crush. It was a horticulturist, was it not, who wished to know what it should profit a man in the end to gain the whole world, yet lose his own soul! It was a pillar of the Church, was it not, who came to the conclusion, after sad experience, that he could not at the same time serve God and take in gate-money! You can grow flowers or fruit; and, if so inclined, may find a market for either. But Horticulture finds its truest exponent in the man who prizes beauty and fragrance for their intrinsic excellence; qualities that make the world fairer and better, and whose perennial loveliness and perfume would continue to charm even if they did not fetch a dollar at wholesale. This Society was not founded to sell fruit, but rather to eat it; and therefore to ensure that it shall be fit to eat. We learned long ago that we could go further than Capiaumont or Clairgeau, and fare no worse! Besides, living some centuries after Shakespeare, we have found abundant reason to differ from his somewhat careless dictum that the Queen of Flowers, if dubbed *Symplocarpus fœtidus*, would smell to my lady's taste. Our practice, like our charter, should ever indicate progress. Now and then we may blunder, following blind guides. Now and again we may go astray, attracted by the lure held out by Mammon, and neglecting the strait and narrow paths wherein Flora and Pomona would fain confine their votaries. And, in the long run, the profit to the individual, nor less to the Society, is greater, as we manage. The Florist, or Pomologist, who can win premiums in competition before the judges whom it is our fortune to possess, may safely challenge impartial judgment at any horticultural exhibition, I care not where held. It was so when Merrifield and Salisbury swept the Massachusetts board of its prizes; and Blake and Hixon furnish constant proof that there is no degeneracy in the later generation. So may it be ever; excellence continuing our sole aim and ultimate attainment.

We offer premiums for superiority of Flowers, Fruits, or

Vegetables; and, so far as we adhere to the standard set up by ourselves, may claim to be measurably successful. But do we exalt or degrade Pomology when in one breath recommending Hornet Raspberry and thereafter strike it from our list? When we depreciate Durandeau Pear below Paradis d' Automne, traversing the knowledge and traditions of the elders! When we relegate Dix—a standard variety of our own Massachusetts—to the rear in inferior rank with Frederic Clapp, wherof the sole claim to notice was ever and only that its trumpet was blown from Boston, whose geese are invariably swans! Practically, you declare the Worden Grape to be worthy of higher appreciation than Lindley, or Massasoit, and of twice the value of that unequalled out-door variety—Iona! Even Niagara and Pocklington take precedence of Iona in our schedule, although there is little market for them, since appetite cannot be coerced; and Green Mountain is promoted from that forlorn awkward squad whose pulp is insoluble as its juice is indigestible, of possible value in a State of Prohibition, mayhap, but which even in such a benighted region must surely set the children's teeth on edge. By what rule are we guided in framing our schedule, presumably challenging excellence in its several classes! Shall we discard all that D. Waldo Lincoln and John Milton Earle commended,—those choice kinds that Colton, Jaques and Ripley imported because better than most that we then had! A generation since these worthies sat down in this library, and applied themselves to a close analysis of specimens fully grown and thoroughly ripened, putting upon record their judgment as it has been transmitted to us, in the reports of the Society, through the columns of the *Spy*. Shall we impeach the delicacy of their taste or the soundness of their conclusion? Yet, every year, not being much wiser than they, accepting some hastily formed prejudice, in sheer abnegation of material test and decided preference, we tear our schedule in tatters, adhering to nothing, unsettling everything. Can we assign a valid excuse for this continual scaling down, and paring off from our early standards of excellence? Yet varieties are degraded, if not discarded without so much as a why or wherefore, although they passed

muster in keenest rivalry among the most expert pomologists of England and France for their points of conceded preëminence; subsequently attracting attention and constraining purchase by our founders above-named, ever alert to secure any fruit worth having. Order, not change! is Heaven's first law. Because only one or two of our members exhibit a fruit of manifest first quality, shall we therefore reject or degrade it? Some one must be first to introduce it. If others approve its quality, it may or not be widely disseminated, which it certainly will not be, if the Society remain blind to its merits, or precipitately discards it after brief recognition. Quite a lifetime is needed to enable a satisfactory test of the qualities of such enduring fruits as are comprised in the genera—Apple, or Pear. A suitable decision cannot be based upon individual craving for premium or gratuity, but rather upon a continuous trial of flavor and texture in the original package, or upon the approval that may be finally awarded after the pie has been comfortably digested. It is a rule of the common law—*stare decisis!* Shall it enure to the advancement of Horticulture to build up, merely to tear down, a house of cards! Says a writer in the *Gardener's Chronicle* (Eng.):

"It seems a pity that most of our best pears are fast going out of cultivation, and this, on account of large, worthless varieties taking their place. It is a pity that such delicious kinds, as Seckel, Comte de Lamy, Ne Plus Meuris, Winter Nelis, Thompson, Dana's Hovey, and others, that do not find favor with judges on the exhibition table, do not receive more attention."

Such, and so universally conceded, is the preëminence of Seckel that we could not, if we would, ignore it, although contenting ourselves with the trees that we already have. From afar,—even from the remote orchards of Tremont Street, is borne to us the acclaim of Dana's Hovey, "horns" of Boston, "so thin and clear," transmitting its local repute, which judgment, if we do not approve, we are given to understand, with a certain condescension, derogates by so much from our common sense and pomological knowledge and standing. Winter Nelis has been mentioned elsewhere in the reports of your Secretary,

and never without just commendation. In England and France, the great Pear-growing countries of the world, wherein curiously enough the varieties of *Pyrus Communis*, unlike those of *Pyrus Malus*, that are of signal excellence and most thrifty, are likewise unsurpassed throughout our broad Republic, it ranks with the very best three,—whether for exquisite flavor or late keeping. For another of that trinity, you suffer Marie Louise to exhaust itself through sheer fecundity, subjecting it thereafter to a penalty for the inevitable depreciation which you were too indolent to prevent. You do not,—or will not,—grow Josephine de Malines; electing rather Angoulême or Clairgeau, than either of which, to a healthy appetite, a White Egg Turnip more agreeably waits upon digestion. Stars upon the catalogue of the American Pomological Society, in whose deliberations we participate and by whose judgments we should be concluded, count for nothing! our schedule being controlled by individual whim or prejudice; although our early records are crowded with testimony of the prophets and apostles of our local pomology, by whom the faith once delivered to them was treasured up for us in the hope and faith of its care and ultimate preservation. I would not interpose the least obstacle to the onward march of progress, if only its steps are assured. But I would be certain that the step is in advance; and insist upon positive proof of decided advantage before discarding the hardly-earned lessons of a half-century of experiment and instruction.

Under the caption,—"Boston Board of Trade—Mad,"—the *Herald* of our metropolis, on Sept. 6th, ult., scores the N. Y., N. H. & H. Railway Company for its dilatoriness, lack of accommodation, and high rates of charge, throughout the past season, whereby the transporation of fruit,—the Peach especially,—was seriously retarded, to the great loss of New England. The complaint of Worcester weighs as heavily, if not against the same corporation. Fruit cannot await the convenience or endure the spite of any common carrier. It must be picked in advance of ripening to reach its market in any sort of fair condition; a delay that would not be sensibly felt with Apples or Pears being fatal to the continuance in soundness or texture of

the softer fruits. Now we prefer to grow our own Peaches, and do so when we can. But for some cause inscrutable as yet, we cannot rely upon a sure harvest whether of cling- or free-stone. Therefore we seek to trade with Hale, recking little if he counts himself a citizen of Connecticut, or Georgia, and being unwilling to submit to any interruption of our traffic that is without adequate excuse. The influence of this Society, if not its official coöperation, should surely be cast upon the side of every effort that promises to facilitate the utmost freedom of trade between the States of the Republic! A freedom whereof the desire tended more than aught else to promote a more perfect union; and in the absence of which we should find but wretched substitutes in custom-house and standing army.

In the matter of publicity, during these latter days, wherein is involved the comparative utility of entire ignorance or presumptuous misinformation, how shall we decide! Shall old creeds pass away and all things, if only novel, obtain acceptance? Yet a writer of prominence, in the *Massachusetts Ploughman*, treating of the growth of "Small Fruits," runs counter to all standard authority, audaciously declaring that the planting of them should be done in Spring instead of Fall. Yet in Spring, when the ground is free from frost, there is apt to be a series of weeks in which no rain falls, and drought, more or less severe, usually supervenes. Whereas in Autumn the fine, hairlike rootlets start rapidly into growth and, if not favored by timely rain, are sure to derive benefit from seasonable snows unless, which is rarely the case, the earth may have frozen prematurely. Again: speaking of Raspberries, the writer declares that "of the red, or sucker varieties, he does not know that the land can be made too rich." Possibly not,—as he understands it; yet, when rich enough, why waste an excess of manure that is sorely needed in corn-field or orchard! Years ago that theory of Manure and Manure yet again was preached as a sort of saving grace for the degeneracy of Pears. And so our patriarchs—Butman and Rice*, with others, their peers—wearied not in the application of stimulating material, little ap-

*George T.

prehending or at best reckless of that result from consequent surfeit,—inertia, or absolute paralysis of the very soil. Their harvest, for a while, was large,—their specimens unsurpassed. But, in a short while, the orchards of Allen and Ripley, of Stebbins and Townsend, fertilized with judgment but never grossly, assumed their proper position at the head of our line, enabling their zealous owners to exhibit fruit that easily earned a preëminence dearer to such unselfish horticulturists than all the dollars that could be proffered in mercenary lure. The personal experience and observation of your *Secretary* dating from the naturalization of the Antwerps in 1832, conflict positively with the theory and practice of the writer under review. A strong clay soil, turned by the spading-fork, has been found to be most congenial for that best and fairest of all varieties which man cares to eat! Brincklé's Orange. The case was similar with Northumberland Fillbasket, Baumforth's Seedling, and Hornét, all which were first imported by me to be introduced into local cultivation. From such original plantation they have pushed their suckers into and through walks built and compacted of anthracite coal ashes, putting forth thrifty shoots and sending up vigorous canes. Whereas in loam, rendered pliable and loose through the constant application of manure, the wood of the Raspberry becomes soft and sappy, a swift prey to fungus or frost; on the contrary it derives heart and, as it were, stamina from the grit and flint that are too easily assumed to be adverse to its proper development. The wide circulation of the *Ploughman* renders it all-important that its statements should be accepted with caution, and criticised when known facts appear to challenge their very foundation as pomological authority.

And this reference to the Raspberry—*Rubus Idæus*—makes it pertinent to remark that the cultivation of that berry appears to have been almost entirely given up by our Members. Perhaps, as a matter of dollars and cents, this should occasion no surprise. There are many with whom the Raspberry does not agree. There are more who, having partaken of the Onion for their first course, do not crave Raspberries for dessert. Yet it is the one Small-Fruit, in technical designation, that will

bear keeping on ice; that is better for being so kept smothered in cream, whereas the Strawberry would be spoiled by similar usage; and that, whether fresh or preserved, retains its own exquisite, peculiar flavor unimpaired by any method of treatment. A few stools will supply a family owning a small homestead, amply if not profusely. Better buy your Strawberries and escape that "tired feeling" which no one can avoid save the boy whose knees are limber enough to stoop for one if, haply, he may eat two!

The practical failure of the Currant, ordinarily so hardy that its yield can be reckoned upon with certainty, is noteworthy if only for record. It may be that the Frost which followed so nearly upon those intense heats of May whereby all forms of vegetation were forced forward so rapidly, should be held responsible for more than the early lethargy or decimation of the Currant-Worm. The bud and blossom of that especial fruit are usually indifferent to excessive or untimely frost and storm. But when all are precipitated in quick alternation, with now and then a deluge of rain to wash pollen in impaired vitality, even the old-fashioned sturdy Currant-Bush of Massachusetts may well be excused if it fails to yield all the service that we have been wont to exact from it.

The Cherry has always found a congenial home in Worcester; but that good fortune, so far as concerns the fruit itself, has not insured an unfailing yield of Heart or Eagle. In the present calendar year, for instance, there were no specimens of Elton, Black Tartarian, Black Eagle, or Downer's Late Red exhibited on July 11th, the date appointed by your Committee on Exhibitions. Following days of excessive, unseasonable heat were drenching showers and humidity that wilted what it did not blight. Thrifty trees, under the direct observation of your *Secretary*, in a night as it were, developed a harvest of rottenness. Yet remarkable specimens were shown by Miss Gary of Austin *Street*, without much doubt a chance seedling from Black Eagle, and possessing every merit of its putative parent with higher development of flavor and firmness of flesh. During the latter part of July there could be seen upon the stands of our

largest fruiterers a striking novelty in Cherries, reputed to have come from Oregon, which had been duly christened, or nick-named in sport, "Black Republican"! Despite its long journey and suspicious name it was perfectly sound, and so remained, plainly manifest, for days. Its flesh was very hard, of a liver color, and its size was almost half again that of a fully-grown Tartarian. The texture of its flesh was such as to suggest Tradescant's Black Heart, sometimes misnamed Elkhorn. If that variety from the Pacific coast, under its slang or true name, can be naturalized here in Worcester, it ought to prove a decided acquisition. And that it can be so naturalized its perfect condition, after prolonged exposure, would seem to establish beyond question.

Malum, Pyrumque,—first cousins as it were,—many of like exquisite beauty and perfection of flavor; yet, for some reason hitherto inexplicable, while one will bear profusely during successive years, the other coyly refuses aught more generous than a biennial harvest. This year, as last, Bartlett, Bonne de Jersey, Bosc and Comice, bend beneath their superabundant burden; but Astrachan, Baldwin, Greening and Northern Spy, A. D. 1895, are apparent only in that vacuum pronounced the abhorrence of Nature, and yet for which Nature through her mysterious processes, must be held responsible. Shall nothing be found out to remedy this grave defect in pomological generation? Shall we fold our hands in supine indifference to an inertia of Nature so seriously affecting our material interests and, not less, our bodily welfare? The Treasury of the Commonwealth is depleted in a futile struggle to countervail Insect Fecundity. Has the first practical step been taken to determine if it is utterly hopeless to expect, sometime in the future it may be, an annual harvest of Apples? Individual effort can accomplish little. Any of countless obstacles may interrupt private experiment even should not Death intervene between the trial and its prosecution. But the Agricultural Colleges and Experiment Stations, founded by Federal, and fostered by State, bounty, endure co-eval with civil institutions, and to them we have a

right to look for a solution of this problem so vital to individual thrift and public prosperity. We might worry along without forest or shade trees. But would life be especially worth living, throughout the frosts and snows of a New England winter, deprived of our standard fruit, as we may yet be, entirely! Who shall say, in our complete ignorance of the cause why a tree is barren every other year, that it may not refuse its yield at the periods when it has hitherto borne to exhaustion! There must be a reason for such regular, assured intermission, whether we know it or not. The spasmodic attempts that we have made to solve the mystery,—shearing of blossoms and thinning of sets,—are foredoomed to failure from the first. The generation of *Ocneria dispar* is incessant,—endless. Still the public treasure is lavished in a futile effort to suppress that infinite fecundity. Pomology is left to fight its own battles, as best it may; and not a hand is lifted, not a voice raised in behalf of this most important product that our soil should surely yield. This very Hall is resonant with chatter and din of wordy champions who kill time, if naught else, by vociferous declamation upon the beneficent influence of qualified Tuberculosis upon the animal and human systems. Just contrast last year with this! There is scarcely a man before me who did not gather from his Orchard a superfluity of Apples wherewith to glut the Home-Market, or to supply the wants of foreign consumers. But now the puzzle with most of you must be,—If you indulge in Apple-Pie on Thanksgiving, will you not have to gnash your teeth at Christmas? And leaving out of consideration that the silver which jingled so melodiously in your pockets, last Autumn, when you could find yet one more barrel of Baldwins for successive customers, might as well not be coined for all the good it can do those whose sole harvest has been foliage and caterpillars. It so happens that the Orchards of England,—our best customer,—have borne profusely, the current year. But there was never a time, within the memory of living man, that the Apples of Worcester County, preëminently among others, did not, from superior beauty and flavor, command their own market at Covent Garden, despite competition. Even now, in mid-October,

we get the subjoined quotations, in the most thrifty boroughs of Scotland, for the following varieties of Apples:

King	18 @ 21	Shillings.
Baldwin	16 " 18	"
Greening	11 " 13	"
Northern Spy	13 " 16	"

From London comes the report that "by the end of October the market will be sufficiently cleared of Native Apples to make a demand for good American Apples." But, at that date, the exports this season had been about 37,000 barrels against 134,-000 barrels to the same time A. D. 1894. Note that the prices given above were shillings sterling; in excess of Three or Five Dollars per barrel according to the variety. Now presumably, your *Secretary*, like a true Yankee, values the Apple for its own sake;—not at all because of its greater or less parity in silver. He is unfashionable enough to believe in Pie! and sufficiently a philosopher to shield himself behind the example of Emerson in owning up to a craving for that common, popular relish. It is therefore that he welcomes the even-numbered year with its felicitous accord of fecundity and quality; and hearkens during the digestion of each appetizing morsel to the melodious chink of the white metal as it weighs down your pockets in exchange for your superfluity of our noblest, if most unreliable, fruit.

"The English market," continues the report, "would take our Apples, if sound;" but we have them not, even of inferior quality. Why not! let me again ask; the question that will not down until the puzzle finds its solution. Think of the area of land in this county that is so well fit for no other harvest! More than a half-century ago Sampson V. S. Wilder planted the fertile acclivities of Bolton and Sterling with those vigorous Orchards wherefrom Jonathan Forbush was wont to load our tables and enrich our early exhibitions. Now, we are privileged to see no specimens from a wider radius than will comprise our immediately co-terminous towns! Is the same land put to better or more profitable use,—or merely surrendered to Birch and Solidago? The thrifty Town,—our goodly neighbor,

wherein Joseph C. Lovell was so assiduous in persistent and skilful experiment, must be ruthlessly submerged, without a voice raised in remonstrance, that a shiftless waste of water may be continued in the metropolis, whose inhabitants might easily save enough from bath or wash-tub to quench all the thirst they ever experienced for that malarious and maleficent liquid. Reflect upon the income whereof you are deprived because you will not apply yourselves, with inexorable purpose, to ascertain and determine beyond peradventure the cause of this regular, if intermittent, barrenness. Since the above was written, on the 28th October ult., but nine days ago, quotations of prices for varieties in which we are most directly concerned, in the London market were as follows:

Baldwin	14s. 6d.	@ 17s. 6d.
Greening	11s. 6d.	" 12s. 6d.
Northern Spy	14s. 3d.	

Does not such valuation confirm the prediction that in the exhaustion of the earlier native supply would be found an opportunity for good American Apples!

March 3, A. D. 1842, this Society accepted a charter from the General Court and by the explicit terms of that instrument, engaged—"To advance the science and encourage and improve the practice of Horticulture." For that purpose, with a view to promote the objects of its organization, it has been able in the course of time, through frugality in management and the bounty of generous members, to accumulate means wherewith to construct this Hall. In this Horticultural Building, scrupulously restricted within its legitimate dedication, there have been the will and facilities, as occasion served, to extend a helping hand in the formation of numerous societies, of very like intent, and cognate direction with our own. Many years ago we tendered our hospitality to gentlemen who sought to found a New England Agricultural Society. That formation still exists, although its founders were long since gathered to their fathers. Subsequently, there were opportunity and wish to accommodate the large number desirous of evoking form and order from the methods of mismanagement sadly conspicuous in the conduct of

the New England Society; and to this hall does the Bay State Agricultural Society trace its origin. The youngest among you can recall the very recent nativity of the "Massachusetts Fruit Growers," who did us the honor to select for their president a gentleman in whose expert service as judge of fruits we have had such prolonged and ample cause to rejoice. And now may we not justly pride ourselves upon the fact that Mycology has been deemed not wholly unworthy our attention; and that such facilities for its study as we possess, or can obtain, are held at the call and service of those who would master this useful, if somewhat humble, knowledge. In return, as sole compensation for the aid thus freely rendered to those who would broaden the province of Horticulture, it is our satisfaction to know that we have never wearied in well-doing; but contributing from our substance to all good works, have been steadily required to pay heavy tribute to Cæsar. We submit to what is neither more nor less than exaction; but it is with ill grace. We pay tribute, since we cannot help ourselves; but reflect the while upon that bold evasion of the Bill of Rights which disregards the equality of every citizen before the law and imposes burdens grievous to be borne upon those whose only motive for existence (corporate!) is an unselfish ambition to foster wholesome science and improve its practice. Whether or no,—we will continue to promote every enterprise, within our scope, that has for its motive the advancement of humanity and, to that end, strive to stimulate the better cultivation of Flowers, Fruit and Vegetables. To all such our hall is thrown wide open, although the assessors lock step with the audience as they enter. Some efforts may be fruitless, yet they will be a common misfortune and not our especial fault. Some forward steps may be taken in Horticultural science and practice; and for such advance we may pride ourselves as one of those who have found a better use for their talent than burial in a napkin!

As I look around upon this audience and note how few of the faces, once so familiar, are left to return my gaze; as I am reminded by this apparent, if not actual, loneliness, how recent

has been the accession to the Society of most of you compared with my own service of now fifty years; I am tempted to wonder if you clearly appreciate your solid position as members of this Worcester County Horticultural Society! Has it been impressed upon you as a vital, ever-present consciousness that you are not alone "citizens of no mean city," but that your association with this especial Society lends dignity to yourselves as individuals and enforces respect for the municipality wherein you elect to dwell. Perhaps, as one of the very oldest among you, who is spared while all around him, youth and age, have been gathered in indiscriminate harvest, it may be permitted me to exhort you to keep ever in mind your high privileges, and to maintain them unimpaired so far as constant vigilance will permit. You constitute one of two,—certainly not more than three,—societies, specifically organized and designated Horticultural, that enjoy repute, have earned sound credit and character, and possess subtantial property that is free from onerous encumbrance. You admit, welcoming even, all who are worthy, from street or lane, from town or farm house; but then, let all, when associated, become loyal horticulturists! We want neither Goo-goos! nor Garoos! neither A. P. A.'s,—nor Americans that are ineradicably Irish. Admit plain farmer, or titled granger; original Yankee, or receptive foreigner; drawing the line at turbulent Huntschagist or unspeakable Turk! For traditions trace back to Eden wherein was—"a Garden *(Hortus)* eastward," in which was put the man "whom He had formed, and from the ground whereof He made to grow every tree that is pleasant to the sight and good for food." Our lines are cast in pleasant places, if so be that we are minded to enjoy them. Heat may be oppressive at times; and then again the mercury falls below zero; to exceeding gain of the coal trust! Also drought occurs, as the men who have idle dams to sell are well aware. But so, in emergency, supervene spells of thirty-six hours, in which the flood-gates of heaven are open, a half-foot of rain refreshing the parched earth without leave or purchase from "protected" manufacturer. As individuals, you would fare no better, it matters not where you

went. As associated horticulturists, you can find choicest Apples or Pears at home, as good Peaches as any of which California or Georgia can boast; and may grow, with perfect assurance of success, such a profusion of flowers as would suffice to replace every tint of the rainbow, were the original pattern unhappily lost. Be not led astray then, in strange paths nor suffer yourselves to be deluded by tempting contrivances of the adversary! Remember always that it was from Eden that you were beguiled, originally! Keep the home that you have been so fortunate as to acquire sacredly dedicated to its legitimate purpose; nor ever allow it to be perverted therefrom, no matter what, or how plausible, the pretext. Horticulture, within the scope of its entire comprehension, has its own noble aims;—ample for the exercise of any ambition. Confine yourselves closely within its limitations and you may live lives of abounding usefulness, while your children shall rise up and bless your memory.

All which is Respectfully Submitted

[by]

EDWARD WINSLOW LINCOLN,

Secretary.

Horticultural Hall,

Worcester, Massachusetts,

7th November, A. D. 1895.

REPORT OF THE LIBRARIAN.

REPORT OF THE LIBRARIAN.

To the Members of the
Worcester County Horticultural Society.

Your Librarian respectfully submits the following report:

During the past year the Library has been open every day, Sundays excepted, from 8 A. M. to 6 P. M., proving a great convenience, not only to our members, but others interested in investigating special lines of Botany during the Summer.

The following Books, Periodicals, and Papers have been added during the past year:—

United States Department of Agriculture:

Agricultural Library Bulletins. Accessions to the Department Library, July 1, 1894, to July 1, 1895.

Report on introduction of Domestic Reindeer into Alaska. By Sheldon Jackson. 1894.

Farmers' Bulletins Nos. 21, 22, 23.

Weather Crop Bulletins. Weekly. New England Division.

Report of the Secretary of Agriculture for 1893.

Report of the Assistant Pomologist. W. A. Taylor. 1893.

Bureau of Education:

Report of the Commissioner of Education. Vols. 1 and 2. 1891 and 1892.

History of Education in Connecticut.

History of Education in Tennessee.

History of Education in Iowa.

History of Education in Rhode Island.

History of Education in Maryland.

Bureau of Statistics:

Consular Reports. Nos. 170 to 181, inclusive.

Civil Service Commission:

Tenth Report, July 1, 1892, to June 30, 1893.

Eleventh Report, July 1, 1893, to June 30, 1894.

Connecticut State Board of Agriculture and Experimental Station. T. S. Gold, Secretary. Report for 1894.

Cornell University Agricultural Experimental Station. Bulletins Nos. 74 to 100, inclusive.

Michigan Agricultural Experimental Station. Bulletins Nos. 113 to 121, inclusive, and Nos. 125 and 126.

Special Bulletin. When and What to Spray.

Rhode Island Agricultural Experimental Station. Bulletins Nos. 29 and 30.

Massachusetts State Board of Agriculture:

W. R. Sessions, Secretary. Report for 1894. 20 copies.

Massachusetts Crop Reports. Series of 1895. Bulletins Nos. 1 to 5, inclusive.

Hatch Experimental Station. Bulletins Nos. 26 to 29, inclusive.

Meteorological Observations. Bulletins Nos. 69 to 81, inclusive.

Bulletin. Special Fertilization of Garden Crops. Prof. C. A. Goessmann, Amherst College.

Bulletin. Plant Diseases. George E. Stone, Amherst College.

Acts and Resolves passed by the Massachusetts Legislature, Session 1895.

Massachusetts Horticultural Society Transactions. Part 2, 1892. Part 3, 1893. Part 1, 1894.

Field Columbian Museum. Publication, No. 1. Vol. 1. A Historical and Descriptive Account of the Field Columbian Museum. Chicago, Dec., 1894. Fred. J. V. Skiff, Director.

Worcester North Agricultural Society. Transactions, 1894. Premium List, 1895. George Cruickshanks.

Worcester Agricultural Society. Transactions, 1894, including By-Laws and Membership. John B. Bowker, Secretary.

Worcester Parks-Commission. Report, 1894. Edward Winslow Lincoln, Chairman.

Inaugural Address for 1895. Hon. H. A. Marsh, Mayor.

Harvard Graduates' Magazine. Vols. 1 and 2, and No. 1 of Vol. 3. Edward Winslow Lincoln.

Grasses of the Pacific Slope, including Alaska and the adjacent Islands. Dr. George Vasey, Botanist of the United States Department of Agreulture. Part 1, Oct. 20, 1892. Part 2, Jan. 1, 1893. From Joseph Jackson.

Georgia State Horticultural Society, 16th AnnualMeeting, July 29 and 30, 1891.

Fruit Growers' Association of Nova Scotia. Transactions, 1874 and 1883 to 1890, inclusive.

Profits and Cost of Fruit Growing in Nova Scotia. S. C. Parker, Secretary of Fruit Growers' Association.

Through Glade and Mead. By Joseph Jackson. 1895. From Joseph Jackson.

The Knight Templars' Souvenir. Boston Conclave. James Draper.

The Index. Published by Junior Class of the Mass. Agr. College. Vol. XXVI., 1894. A. S. Kinney.

A Souvenir of the Celebration of the Fifty-fifth Anniversary of the Worcester City Guards. Sept. 19, 1895. Lieut. Samuel Hathaway.

Purchased by the Society:

A Treatise on the Physiology of Plants. Paul Sorauer. Translated by F. E. Weiss.

A Guide to find the names of all Wild Growing Trees and Shrubs of New England by their Leaves. E. Knobel.

In the British Guiana. James Rodway. 1894.

The Diseases of Trees. Prof. R. Hartig. Translated by William Somerville. Revised by H. Marshall Ward. 1894.

Protection of Woodlands. Herman Furst. Translated by John Nisbet. 1893.

The Flowers of Japan and the Art of Floral Arrangement. J. Conder.

Sylva of North America. Sargent. Vols. 7 and 8. Dewey Fund.

The Wild Flowers of the North Eastern States. By Ellen Miller and Margaret Christine Whiting.

Journal of Horticulture. 2 vols. Nos. 28 and 29. 1894.

Manual of the Mosses of North America. By Leo Lesquereaux and Thomas P. James.

Gray's Botanical Text Book. George Lincoln Goodale. 1885.

The Natural History of Plants. From the German of Anton Kerner. By F. W. Oliver, with assistance of Marian Busk and Mary F. Ewart. Vol. 1. Parts 1 and 2.

Choice Ferns. 3 vols. By George Schneider.

Les Fleurs de Pleine Terre. A description and the culture of annual, bi-annual and bulbs. By Vilmoren Andreux & Co., and Edonard Andre. French.

Curtis's Botanical Magazine. Vol. 50. 1894.

Synopsis of North American Lichens. Part II. Ed. Tuckerman.

Genera Lichenum; an arrangement of North American Lichens. Ed. Tuckerman.

Descriptive Catalogue of the North American Hepaticæ. By Lucien M. Underwood.

The Woods of the United States. Jesup's Collection. By C. S. Sargent.

The Orchids of New England. Henry Baldwin.

The Forester. 2 vols. Brown and Nisbet.

Through Glade and Mead. By Joseph Jackson. 1895. Large volume. 25 copies of the small edition to use for gratuities.

Forest Flora of Japan. Notes on the Forest Flora of Japan. Charles Sprague Sargent. 1894. Quarto.

Mushrooms—How to grow them. Falconer. 1892.

About Mushrooms. Julius A. Palmer. 1894.

Edible and Poisonous Mushrooms. M. C. Cooke. 1894.

Our Edible Toad Stools. W. Hamilton Gibson. 1895.

Town Records, 1822 to 1827. Births, Marriages and Deaths. Part 1. Vol. XII. 1894. F. P Rice. Worcester Society of Antiquity.

Amateur Gardening.

American Florist.

American Gardening.

Country Gentleman.

Florist Exchange.

Farm and Garden.

Garden and Forest.

New England Homestead.

Massachusetts Ploughman.

Meehan's Monthly.

Gardening.

Rural New Yorker.

Daily Spy.

Agricultural Gazette. English.

Garden. English.

Gardener's Chronicle. English.

Gardening, Illustrated. English.

All of which is respectfully submitted.

ADIN A. HIXON, *Librarian*

Horticultural Hall,
Worcester, Mass.,
November 6, 1895.

REPORT OF THE TREASURER.

The Treasurer of the Worcester County Horticultural Society submits his annual report for the year ending November 5, 1895.

He congratulates the Society upon the improved state of their finances, the receipts from the rent of the hall show a gratifying increase over that of the previous year, and the prospects for the coming year would indicate still better returns.

It should be borne in mind, however, that there is still a debt of $11,400, with the interest steadily accruing.

The funded debt of the Society has been reduced the past year $1,500 and the Treasurer trusts that the next year will show a still greater reduction.

The receipts and disbursments have been as follows:—

Dr.

1894.			
Nov. 2.	Balance, as per last report,		$ 530.74
1895.			
Nov. 5.	Receipts to date:		
	From rent of stores,	$6,000.00	
	rent of hall,	4,411.92	
	membership fees,	61.00	
	Chrysanthemum exhibition,	114.00	
	tickets to banquet,	142.00	
	Dewey Fund, for books purchased,	43.16	
	interest on bank deposit,	29.42	
			$10,801.50
	Total,		$11,332.24

Cr.

1895.			
Nov. 5.	Payments to date:		
	By city taxes and water rates,	$ 803.04	
	paid on mortgage note,	1,500.00	
	premiums paid,	1,947.55	
	paid judges,	150.00	
	for coal,	260 93	
	for gas,	766.54	
	interest on loan,	669.72	
	salaries,	1,645.79	
	A. A. Hixon, expenses at hall (including janitor),	913.79	
	for printing,	375.80	
	books and stationery,	123.84	
	on account of banquet,	111.20	
	repairs and improvements,	700.65	
	for china, etc.,	60.43	
	rent of box at Safe Deposit Co.,	10.00	
	Total,		$10,039.28
Nov. 5, 1895.	Balance of cash,		1,292.96
			$11,332.24

THE F. H. DEWEY FUND.

Balance, as per last report,	$1,000.00	
Received interest since,	60.80	
		$1,060.80
Paid for books and periodicals,		43.16
1895. Nov. 5. Balance of fund,		$1,017.64

Respectfully submitted.

NATHL. PAINE, *Treasurer.*

Nov. 5, 1895.

The undersigned hereby certify that they have examined the accounts of the Treasurer, and find the same to be correct and properly vouched, and that the cash balance is accounted for.

HENRY L. PARKER,
F. H. CHAMBERLAIN, } *Auditors.*

WORCESTER, Nov. 5, 1895.

WORCESTER COUNTY
HORTICULTURAL SOCIETY.

4th January, A. D. 1896.

ADDRESS

BY

O. B. HADWEN, President,

At the Opening of the Winter Course of Meetings for Essays and Discussion.

In discharging the duty incumbent upon me at the opening of the winter series of meetings of our Horticultural Society, I do so with some misgivings, that at least in some departments of Horticultural interests I am not capable to speak within the scope to which our discoveries and advancement have attained.

The winter meetings are proving of greater benefit to our members from year to year. They bring together, weekly, men and women animated with the one prominent desire, the advancement of practical and scientific horticulture; and so long as this policy is pursued, so long will we advance in the successful and refining pursuits of the garden and orchard, and maintain the fostering source to disseminate the knowledge and science pertaining to horticulture and its kindred callings.

Following the early annual work of the Society, the weekly exhibitions of fruits, flowers and vegetables in their respective seasons during the early spring, summer, and autumn, bring to our hall contributions of the highest merit and excellence.

The products of one advanced in the knowledge and science of his specialty, is always an object lesson, which stimulates the

beginner to higher and more persistent effort; the ingenuity of each contributor of fruit, flower or vegetable is brought out for inspection, and increases as time goes on. The cunning hand of nature assisted by the hand of man proves a charming weekly temptation to all, as the ripe years wane. Thus has Horticulture advanced through the work and influence of this organized Society, from the crude and imperfect culture of the earlier times, to the high standard attained at present, and as we progress the horticulturist will continue by intelligent work to advance both in practical and scientific art, in growing and crossing with the tendency to produce new and desirable kinds of fruits, flowers and vegetables, so necessary for the health and happiness of life.

When we review what has already been accomplished in the past half-century by the interchange of trees and plants, also of personal experience afforded at the weekly meetings, can any one correctly estimate the progress of the remainder of the century? By the foresight and wisdom of the gentlemen who founded this Society, we enjoy this beautiful hall most admirably planned and fully equipped for all the purposes of our Society. I believe I am the only person living* who attended the meeting when the committee of seven (7) was chosen to purchase the site whereon this building stands. It required at that time men of broad gauge and courage to attempt the purchase of land and erect a building adapted to the uses of this Society. The limited fund at that time, 1850, amounted to 5,126 dollars, the land cost 6,847 dollars, and the building 11,278 dollars when first constructed. Since that time it has been altered and improved at two different times at an expense far greater than the original outlay. We now have very beautiful halls, both in style of architecture and convenience, most admirably situated and suited to the purposes of the Society, and they are very popular and well patronized by the general public. In making these changes the Society found it necessary to incur indebtedness to a considerable amount, which is being liquidated by annual payments of both principal and

*The Secretary takes exception to the breadth of this statement.

interest. As the debt is diminished the Society is enabled to broaden its scope and encourage its contributions in corresponding ratio with increased offers of premiums.

The winter meetings planned for essays and discussions are proving a wholesome feature of the Society, adding much value to our Transactions with the printed experience of our best cultivators upon an extended variety of subjects, and as they continue will prove a valuable Encyclopædia of Horticulture and its kindred interests.

The interest in our winter meetings is manifest by an increased attendance of both ladies and gentlemen. The essays and discussions following fully occupy the allotted time. Either full or abstract reports appear in the daily papers, also in our Transactions. But it would seem by the teachings of Nature that the lessons of Horticulture are never to be finished; the college course of Horticulture is to last while time lasts; something new and interesting occurs every year, which nurtures the hope for increasing knowledge and usefulness as sometimes old and discarded plants are rejuvenated and again become new, with the constant interchange going on with all the countries of the earth, and must ever be of encouraging interest.

The soil of Worcester County is proving itself well adapted to the growth of nearly all the fruits of the temperate zone. By the application of the approved modes of culture, fruits are found upon our tables of rare excellence, not only of good size and beautiful color, but unsurpassed in flavor, and far superior in this respect to those of other sections of this country.

Flowers are also as finely grown here as anywhere, as our exhibitions annually prove, if we may except the chrysanthemum, in which much yet remains to be accomplished, to bring it up to the highest standard of perfection. It is quite obvious, however, we are on the right course to ultimately attain the desired information which will insure success.

Perhaps we have something to learn in regard to staging our special exhibitions of flowers to produce the best and most pleasing effect. The many varieties of flowers of more recent introduction from Japan are proving especially well adapted to our soil and climate, and are found among our best hardy flowers,

adding great variety and a wealth of beauty to our exhibitions.

The exhibitions of vegetables continue to improve, and the specimens for exhibition are, as a rule, especially well selected. Every season brings forth something new, proving interesting and well worthy of cultivation. More exhibition space is required in each recurring season. The interest of visitors in this department is especially manifest, as good vegetables contribute largely to good living.

Ornamental Trees constitute a portion of the vegetable kingdom in its broader sense, and, while they cannot be brought to our exhibition halls, they can, and do, ornament our grounds. They do add to refined taste and beautify the landscape. They have never received any encouragement from our Society by awards of premiums, but their importance should be encouraged in the beautifying of parks, farms, and all grounds where ornament contributes to the landscape and a more refined culture. The variety is yearly increasing, both by new sorts raised from seed and by importations from other countries.

On the whole I may in brief congratulate our members that we maintain a good standing among the Horticultural Societies, being at least second in wealth and influence among the societies of this country. Our interests are on the increase, and after fifty-four years of devoted labor we may feel justly proud of our inheritance and whatsoever we have added. All of this has been consummated by a steady and judicious course of conservative and wholesome management. We have not embraced with both arms every phantom that presents itself, which has often proved the embarrassment or ruin of so many Societies, but have maintained a judicious and well directed course, within our means, which has so largely contributed to our success. It is not my purpose at this time to elaborate, but merely to throw out a few hints, and afford time for the discussion which may follow.

We all naturally feel grateful for the success of the Society, in its sound financial condition and its usefulness to its members, and the gratification received by the general public at our exhibitions, which are free to all.

17th January, A. D. 1876.

ESSAY

BY

JAMES DRAPER, Worcester, Mass.

Theme—Our Home Grounds and our Roadsides: Their Influence on our Lives and the Lives of Others.

In presenting some thoughts upon our home grounds and our roadsides (their influence on our own lives and the lives of others), I am well aware that I am not entering any new field, but simply offer some suggestions as they occur to me, growing out of my own experience and observation, that may possibly prove helpful to others.

My object is to touch upon rural or suburban homes, rather than those within city limitations, where the landscape architect has perfected his work in the homes surrounding, and where the municipal authorities have full domain over the streets or roadsides.

My ideal home is not the one of broad domain, where abundant means enable its owner to employ a professional landscape gardener to lay out and plant on a most magnificent scale, but rather the typical farm home, nestled here and there among the hills, valleys and woodsides of our own native New England, be they near or remote from city or town advantages.

And here let me state, that having been privileged to visit nearly every section of this country, nowhere, in this broad land of ours, do I find so many comfortable and attractive farm homes and illustrations of ideal home life as exist right here in the land of the "Pilgrim Fathers."

"Nothing exerts a greater influence on character than the homes of the people" is an oft expressed saying.

How important, then, that these homes should be surrounded with such comforts and attractions as will contribute to this one great

end. To eliminate every feature that tends to detract from the greatest enjoyment of our home life is therefore of paramount importance.

"Order is Heaven's first law."

A place for everything and everything in its place is a very important factor in the appearance of our home grounds. To this end shelter must be provided for all implements of husbandry as well as every description of vehicle used upon the farm or by the family. It is neither economical nor creditable to any place to leave them where last used, or scattered at random along the roadsides, beside the walls or fences, or around the buildings. If implements and carts, wagons and the like, have reached that state of their existence that they are not worth housing, they certainly should not be allowed to encumber the ground.

The beauty of a shade or fruit tree is not enhanced by being decorated with old scythes, rakes, hoes, chains, hoops, harnesses or horseshoes. Dilapidated chicken coops, discarded furniture, old barrels and boxes, are not only an eyesore to every thoughtful observer, but an object lesson of carelessness and shiftlessness to every member of the household as well as the employés on the farm.

If any parts of these appliances or accumulations are of any value for repairing others, let them be taken apart and carefully placed in the tool-house or workshop, where they can be found readily if wanted. Let the remnants be cremated as far as possible, and the old iron turned over to the junk dealers.

The next disfigurement to our grounds is the promiscuous deposit of rubbish of all kinds,—stumps, logs, old lumber, brush and the like,—which should be reduced to ashes, either as fuel or in one general conflagration. Stones and boulders are not very attractive in large quantities around a place, and the larger share of them at least should be removed from sight.

With this elimination of unsightly objects around the home we are now in a condition to discuss the matter of improvement by planning and laying out our grounds in an attractive manner, and planting such trees, vines and shrubs as may be necessary to accomplish this result.

The construction of buildings for convenience and enjoyment is not a subject to touch upon here, for that question of itself would be enough to engage our attention for a full session.

Drives and Walks.

While the location of the buildings and their distance from the highway will to a certain extent govern the character of the approaches thereto, a few general suggestions may not be out of place here.

While we are well aware that a straight line gives the shortest distance between two points, we should not recommend following that rule in laying out our drives and foot-walks.

If the buildings are on quite an elevation above the road level the location of the driveway should be governed by the grade to be overcome, even if a much greater distance has to be covered between the two points. This brings into use a gracefully curved approach, which, as part of the plan of landscape architecture, is quite an important feature. The foot-paths, wherever constructed, will be governed largely by the same rule.

The method of road building to be adopted will be governed by conditions that will vary in different localities and on different soils. In our loamy or clayey soils we have found it possible to obtain very satisfactory drives and walks by removing the soil to a depth of twelve or fifteen inches, taking pains to leave the road-bed higher in the centre, so as to afford good drainage. We then commence filling with coarse stones at the bottom, then a layer of smaller ones, topping off with coarse gravel, with a light dressing of clay over this to aid in securing a compact surface when completed. There is something gained in this road building besides the securing of a permanent driveway that will be free from mud at all seasons.

The loam removed, if not wanted on the lawn, can be piled in some convenient place until wanted for various uses, and the excavation of the road-bed furnishes a convenient receptacle for stone, which on many a farm is a continual object of removal from field or garden.

The Lawn.

Having constructed our drives and walks, our next work is to grade the remaining grounds properly, using the best soil freely for the upper portion to insure a good growth of grass of a permanent character. After seeding and raking smoothly, a heavy roller should be used to complete the work, so as to leave the ground in a perfect condition for the lawn-mower in after years. A well kept lawn is of itself as attractive and gratifying to the owner of a home as any single feature that can be named.

Where and What to Plant.

We are now approaching a subject that is very difficult to treat upon. No two places are governed by the same conditions or possess the same surroundings. The home that we are considering as susceptible to improvement may be partially or abundantly supplied with shade or

ornamental trees of many years' growth. In this case the trees of smaller size at maturity or some of the hardy flowering shrubs may be brought into requisition in improving the grounds. If the trees already growing are confined to a few native species, like the Oaks, Elms or Maples, the variety can be increased by adding a Purple-leaved Beech, Cut-leaved Beech, or our own native White Beech. The Cut-leaved Weeping Birch in many localities proves a most valuable acquisition, while the Maple family has many choice varieties to select from. The Norway and Sycamore have a sturdy and shapely form of growth, while the Scarlet and silver varieties have a habit of rapid development. The Weir's Cut-leaf is a very rapid growing tree, and on this account may be found of service in some portion of our decorative work. The three last named, making such rapid growth annually, must be severely headed back for many years, so as to insure a strong and stocky growth that will prevent injury by the heavy winds or ice storms so common to our New England climate.

The Schwedler Maple, which presents a bright red leaf in the springtime, and the Reitenbachii, with its dark purple leaves in autumn, are very showy and interesting trees. Among the Oaks the Pyramidal Oak makes an upright, stately growth, in some respects like a Lombardy Poplar, and can be used where room will not admit of the wider branching varieties. The Golden-leaved Oak is an innovation that makes a most striking effect in contrast with the other trees.

The Poplar family have their merits where an immediate effect is desired, and the several varieties, Lombardy, Carolina, Black Italian, Silver-leaved and Golden-leaved form a very interesting group for use in certain places where a rapid growing tree seems to be demanded. In this same direction the European Larch will give quick results, and its light green foliage in the springtime is unsurpassed for beauty and effectiveness.

The Evergreen family are sometimes found desirable for screens or as a protection from severe wintry winds. They want to be judiciously planted, and usually in masses for this purpose. For the hiding of any unsightly objects, especially visible in the winter season, there seems to be nothing else so well suited to the purpose.

There are some of the species of smaller habit or growth that may be used on a limited scale in connection with the planting of our home grounds. The Dwarf Arbor-vitæ in variety, as well as the Retinisporæ, are especially desirable in the proper location. In addition to the trees of larger growth, such as the Spruce, Hemlock, Arbor-vitæ and Pines so long in general use, the Colorado Blue Spruce and Nordmann's Silver Fir are very great acquisitions to our list of Evergreen trees.

In deciding upon the proper location for ornamental trees, a few general rules may be laid down. First, study the surrounding country carefully, and decide what outlooks from windows or piazzas must be left unobstructed; leave open vistas where the views will afford pleasure; and, if in any direction there are little if any attractions for the eye, locate your trees there, either singly or in groups, as space will admit. It is often desirable to plant thickly, with a view of thinning out a part of them when they become over-crowded. But in my years of life among the trees and association with those who have a fondness for tree life and development, I find that it takes more real courage to order removed, from the lawn, a tree that has been planted with one's own hand, and carefully tended for a score or more of years, than it does to attack one's dwelling or stable, and so re-arrange and re-construct them, that there is hardly a vestige left of the original building, to mark its identity in a neighborhood. Again, having decided upon what feature of the landscape we wish to preserve unbroken, let us turn our attention nearer home to some existing conditions, that require the planting of trees to shield them from our gaze.

There may be some of the numerous outbuildings on our grounds, or perhaps on an adjoining estate, that are not particularly pleasing in their effect upon the landscape. Here a group of the smaller growth of trees, of flowering shrubs, and possibly the evergreen species, will be brought into requisition, the taller trees in the background and the flowering shrubs in the front of the same.

Occasionally we find the barnyard enclosure, where the stock are turned out for air and exercise in the winter season, to be the most conspicuous feature of the place. Here the grouping of the stronger growth of shrubs, with an occasional evergreen and some of the deciduous trees, will relieve very materially its objectionable feature.

The stone walls that are occasionally used for an enclosure, if they must be allowed to remain, can be made conspicuously attractive by planting with the Ampelopsis Veitchii, or Japan Ivy, which, in a short time, will cover it completely with its lively green foliage of varied shades.

Having thus treated the pleasing and displeasing features of our grounds, what space remains can be utilized for the planting of such varieties as will best suit our taste. The reckless method of planting indiscriminately all over the lawn is to be avoided, as is also the planting in set rows all along the walks or drives. A few groups of shrubs on the borders of the lawn, at the angles, and perhaps on the curves, or a few placed in suitable positions along the drives, with an occa-

sional clump of the smaller growing varieties near the dwelling, will be all that is needed. The great tendency is for overcrowding rather than the reverse, where there is so large a variety of beautiful shrubs and plants that can be utilized in this decorative work.

Some of these, like the Lilac, Syringa, Spirea, Weigela, Deutzia, Forsythia, Althea, Snow Balls and the like, in their great variety, although in common use for many years, still remain in favor for grouping or single planting. The Japan Snow Balls, Hydrangeas, Variegated-leaved Cornus, Golden-leaved Elder, Golden-leaved Syringas, and Spirea, Purple-leaved Hazel, Purple-leaved Berberry, Purple-leaved Plum, the Japan Rosa Rugosa, with its glossy leaves and showy buds, and an abundant variety from which to make our selections.

There are many trees of medium-sized growth at maturity that are possessed with peculiarly striking foliage, either in the color of their leaves or the wide range in their form and size. Our largest leaved tree is the Catalpa Speciosa, often producing a leaf a foot or more in diameter. This tree is a very rapid grower and produces a very showy, large-sized, white flower. The Magnolia Tripetala gives us the longest leaf, sometimes reaching from twenty to twenty-four inches in length and from eight to ten inches in width.

The Oak-leaved Mountain Ash has a very clean and symmetrical form of growth, and the flowers and berries that follow, make it an attractive tree. This tree and the Linden family seem to be disturbed by the action of borers more than any other ornamental tree that I am acquainted with, but notwithstanding this, they are worthy of giving a little attention by eradicating this pest as it may appear. The Laurel-leaved Willow has a very showy, glossy leaf peculiar to itself, while the Golden-bark Willow produces a very showy effect in the winter season, when the leaves have left the branches. The Maiden's Hair tree, or Salisburia, possesses strikingly unique fan-shaped leaves, and has a good habit of growth. The Sweet Gum or Liquid Ambar, found so abundantly in the Southern States, bears transplanting to our northern clime well and has an attractive form of leaf, which becomes very highly colored in the autumn season. The Tulip tree or White-wood of the West, is worthy of a place in our collection, both on account of its peculiar shaped leaf and its tulip-shaped flower. Experience with this tree proves that to transplant it safely, we must take trees of small size in every instance.

These are but a few of the desirable trees for ornamentation of our home grounds. The list could be extended almost without limit, would time and space allow. The same may be said of the hardy

flowering shrubs, so numerous in variety, so attractive in flower. In the case of the newly introduced sorts, many possess foliage of varied colors, thus giving us an abundance to select from in the adornment of our grounds.

As we progress year by year in this work of improvement, and become familiar with the more common varieties of flowering shrubs, we may desire to make some changes, or add to our collection some of the more rare and costly varieties, or the newer acquisitions continually being brought into the market.

The Japan Maples with their delicately cut foliage of various shades and colors are decidedly fascinating. The Rhododendron and Azalea are costly at the outset, and require the best of care to succeed, but few, if any, plants equal the gorgeous beauty of their flowers. The Magnolia family are almost as showy in flower as those just named, but must have special care in planting and after-culture till they have become firmly established. While the Rose is found growing in abundance in many places, still the large flowering sorts of recent introduction require a constant care and treatment that many are unable to give, in order to produce the large, showy blooms, of all shades and colors, that have been so great an attraction of late years.

Before leaving the question of what to plant, I would not omit alluding to some of our native plants, that possess considerable merit in this direction. Our native Mountain Laurel or Kalmia Latifolia can be utilized, and it is difficult to name a more beautiful shrub when in flower. Its bright, glossy foliage, through the entire year, produces a most pleasing effect. Our native Swamp Pink, Azalea Nudiflora, white and pink, are also worthy of utilization in our work. These, with the Kalmias, must be removed with the earth retained about their roots to succeed well. The Clethra Alnifolia gives a fragrant white flowering shrub, and a small clump in some suitable location would be generally appreciated. For a background against some fence or building, a group of wild Sumach will give a fine effect in the flower and leaf in the autumn season, and for climbing vines to cover hedges, boulders or walls, the Bitter Sweet, Woodbine and Clematis possess a degree of merit that entitles them to our endorsement for these purposes.

Recreation Grounds.

Before leaving our home grounds for the roadside question will it not be well to consider for a moment something in the way of pleasure-grounds for the children of the household? Cannot a small space be given over to their use and graded for a tennis court or croquet

ground? Possibly some groups of trees or a grove may be found within easy access for use in this direction. Let this be cleared of underbrush, stumps and stones, or other obstructions smoothed off, tables erected and seats constructed here and there among the trees. Here the hammock should find its appropriate station, a swing be constructed, with a view to safety, and numerous other appliances provided where child-life would find great enjoyment, and adult-life take great comfort in having placed at their command such opportunities for harmless and healthful recreation.

Our Roadsides.

Three distinct features enter into the improvement of our roadsides: First, a clean carpet of grass from the travelled roadway to the boundary line, excepting so much as is needed for a good foot-path, which is the second feature, while the planting of trees for shade and shelter is the remaining attraction. Here is a good opportunity for coöperative effort. In many places our village improvement associations are doing a noble work, and what they have accomplished in late years within and near the villages is having a very stimulating effect upon those living more remote from the village proper. The spirit of coöperation should exist between the property owners on one hand, and the authorities, to whose care the maintenance of good roads is entrusted, on the other.

If our roadsides are to become the dumping-ground for all the refuse material that it is found necessary to remove from the travelled highway, or if the trees that have been planted and tended for years are to become the victims of the death-dealing road machines, or ploughs and scrapers, we have little encouragement to direct our efforts towards the improvement and beautifying of our roadsides. On the other hand, a general plan of roadside improvement, in which all land owners should take a common interest, and which can be done little by little each year when the regular farm work will permit devoting a few days at a time with team and men, will in the course of ten years produce an effect upon the whole neighborhood, and an increase in value of all property affected far in excess of the first cost of the improvements.

This work hardly needs any advice from me as to the best methods of procedure. If the ground is covered with brush, remove it root and branch. If a promising young tree is found growing in the right place, preserve it. If trees are already there of natural growth and too near each other for proper development, reduce the number so that

they shall not be nearer than thirty-five or forty feet. If stumps and stones encumber the ground, remove them or bury them out of sight. I should not recommend cutting away brush that would leave the rocks and rubbish exposed to view for any length of time, for, in this case, the "remedy would be worse than the disease," but make thorough work each season as far as you go, and there let it rest until another year. Having disposed of all obstructions, the grading and finishing work comes next, and then, by seeding it to grass, our desired object has been attained.

The building of the foot-walk and planting the trees is the next stage of progress, and the width of the walk will have to be governed somewhat by the width of the roads. Usually six feet or more in width can be used for this purpose. Grading, smoothing and gravelling are the three requisites for completing this work, and then we are ready to locate and plant our trees.

Where Shall We Plant Them?

Three positions are to be considered in this direction. The most satisfactory effect is produced by planting them on the edge of the foot-path, five to six feet from the boundary line. This means protection to the trees by guards, which must be maintained for years to come, and even then are subjected to more or less injury by being used as hitching posts for horses, or subjected to wreckage by the hands of careless teamsters. The second position is one foot from the wall or fence; here there is little danger from teams or road repairers, and if the permanent grade of the road is fixed before the trees are planted their permanency and safety is assured. The third location is one foot inside the road boundary line, which brings the trees under the exclusive care and protection of the owner, and there is no risk whatever of injury from causes that exist when the trees are located within the bounds of the highway.

What Trees Shall We Preserve and What Shall We Plant?

As already noted, if we find in the clearing-up process of our roadsides trees already growing at a proper distance from each other, and located where it is desirable for them to remain permanently, they should remain undisturbed if of a suitable variety.

Under this classification I should name, as the most desirable trees, the White Oak, American White Beech, Rock or Sugar Maples, American White Elm, when space is ample, and American White Ash.

The objection to the Red Oak and Basswood or Linden is their sus-

ceptibility to the attack of the borer; the Poplars and White or Red Maples, their liability to injury or wreckage by ice storms.

The Red or Slippery Elm, if discovered by travelling man or boy, will not escape the robbing of its bark, and the Chestnut and Walnut become the victims of severe clubbing and injury to their trunks by pounding without mercy to induce a few stray nuts to leave their snug quarters before being ordered out by the autumnal frosts.

For varieties to form new lines on the roadside I should name the Rock or Sugar Maple, Norway Maple, taking care to thin the branches of this variety as the tree advances in years, so as to avoid too dense a head. The American White Ash will thrive in some instances where the Maples do not succeed. The American Elm may be used where the roads are seventy-five or more feet in width, but never on our narrow thoroughfares. Although the old saying holds good that "he who plants an oak plants for posterity," I believe the White Oak should be encouraged for this roadside planting, and also the American White Beech, two noble and stately trees that future generations would value most highly, even though we ourselves are not permitted to see the fruit of our labors.

There is little further to be said on the subject of roadside improvements. Our object lesson is but to contrast the long stretches of improved roadsides found in many New England towns and villages, and the unimproved portions, so largely in the ascendancy, and which it may be hoped by agitation, coöperation, and some personal self-sacrifice, may sooner or later give way to the permanent improvement of our roadsides that shall reflect credit upon the workmen in the years that are to come.

I am not unmindful of the fact that the expense incurred in these proposed improvements will be maintained by many as being beyond their ability to meet. If this was to be the work of but a single season it might involve an expense that should not be incurred in justice to the other needy expenditures in the farm management. But this is not our intention in advocating these improvements. Our first suggestion is to map out a definite plan of the grounds in accordance with such suggestions as have been offered, and then each year devote some time and money to its accomplishment. There are many days in the course of a year that the farm help, and a team if necessary, can be spared for this work without any detriment to the other interests of the farm.

If one takes a review at the close of each year, of the permanent improvement he has made on his farm lands by reclaiming unimproved

land, in the removal of stones and stumps, clearing of brush, ditching and draining, building or rebuilding of walls or fences, improvements of the farm buildings, and addition to the stock or implements of husbandry, he feels that he has made some perceptible progress. But, if we will give it a second thought, we will find that the principal object has been to increase the facilities for securing a greater revenue from the farming operations.

Would it not be well to direct some of this thought and energy to the improvement of the home ground, where the advantages and pleasures it affords the occupants of the home are not measured by dollars and cents, but by an appreciation, to which the home-makers within bear their constant testimony, and to whom we are under every obligation to contribute our best efforts to secure to them the greatest comfort and happiness.

I have not touched upon the orchard and fruit garden, and the part they contribute to the household economy. Other writers and speakers have been over that ground times without number, and it must be admitted, without appearing to be discourteous, that in arranging subjects for consideration at our State Board meetings, Institutes, Farmers' Clubs, and Grange meetings, the tendency has been almost wholly in the direction of treating upon those questions that have to do with our material prosperity, while the home and its comforts within, and attractions and external surroundings, are rarely brought forward with that prominence that their importance would seem to demand.

If I may be permitted to allude to matters somewhat personal in their nature, I will say that these noble examples of devotion to tree life that have come under my observation in my travels, and particularly in the "City of Elms" and all up and down the beautiful Valley of the Connecticut, have been an inspiration to me to contribute my share in advancing this line of work whenever and wherever an opportunity afforded. I may here add that I have not had to wait long for an opportunity to offer, for I was many years ago called to accept a position on the Board of Parks Commissioners of my own City of Worcester.

One important feature of this work is the planting of the shade trees along our city thoroughfares,* and since my first connection with this work over thirty miles of streets have been covered, using over eight

*To avoid misapprehension, it may be well to state that the planting of Shade-Trees and their supervision is vested in the Parks-Commission of the City and cannot be delegated. There has been a contract with Mr. Draper for years and it is due to him to say that it has been fulfilled faithfully.

E. W. L.

thousand trees. Those first planted, some fifteen years ago, have already acquired sufficient size to afford a most acceptable shade, as well as marking a great improvement in the appearance of our highways.

I must confess that my attachment to these trees has become almost a passion, and their injury or destruction, from any cause whatever, touches with sadness the finest sensibilities of my nature; and I must still further confess that in all the varied activities which constitute my life's work there is nothing in which I take greater pride and comfort than in watching the rapid growth of the trees and the development of beautifully shaded streets in my own city, in the work of which it has been my privilege so largely to share.

What then is the effect of this work upon our lives and that of others? Hon. B. G. Northrup of Connecticut has well answered this question in these words,—"The hope of America is the homes of America. It has long been my ambition to improve the homes and the home-life of our industrial classes, and help them to realize that the highest privilege and central duty of life is the creation of happy homes, for the home is the chief school of virtue, the fountain-head of individual and national strength and prosperity. It is a worthy ambition to surround one's home and children with such scenes and influences as shall make the every-day life and labors brighter and happier, and help one to go sunny and singing to his work. Our youth should early share in such efforts for adorning the surroundings of their homes and planting trees by the wayside."

Said Oliver Wendell Holmes in a letter, "I have written many verses, but the best poems I have produced are the trees I have planted on the hillside which overlooks the sinuous Housatonic."

Said Washington Irving, "There is something nobly simple and pure in a taste for the cultivation of forest trees. It argues, I think, a sweet and generous nature to have this strong relish for the beauties of the forest. There is a grandeur of thought connected with this part of rural economy. It is, if I may be allowed the figure, the heroic line of husbandry. It is worthy of liberal and free-born and aspiring men."

In closing I can think of nothing more appropriate than to make use of a few verses from one of Whittier's poems:—

> "O, Painter of the fruits and flowers,
> We thank thee for thy wise design
> Whereby these human hands of ours
> In Nature's garden work with thine.

"And thanks that from our daily need
The joy of simple faith is born;
That he who smites the summer weed
May trust thee for the autumn corn.

"Give fools their gold and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a field or trains a flower,
Or plants a tree, is more than all,

"For he who blesses most is blest;
And God and man shall own his worth
Who toils to leave as his bequest
An added beauty to the earth.

"And, soon or late, to all that sow,
The time of harvest shall be given;
The flower shall bloom, the fruit shall grow,
If not on earth, at last in heaven."

23d January, A. D. 1896.

ESSAY

BY

Dr. THOMAS C. MENDENHALL, Worcester, Mass.

Theme:—What We Don't Know About the Weather.

Meteorology is the oldest of the sciences. Weather phenomena were noted by the ancients, as correct predictions were of advantage to them in hunting and fishing.

The study of the weather antedates the science of astronomy, which is popularly thought to be the oldest of the sciences. Weather calculation is the most imperfect of the sciences, if indeed it can be considered a science at all. This is due to the difficulties of the problems confronting those who deal with the study. There are but few principles underlying the subject.

The earth's core is in an intensely heated condition. For example we will compare the earth to a globe eight inches in diameter, one inch corresponding to each one thousand miles of the earth's thickness. If we should penetrate fifty miles into the earth's surface we should find it in a heated condition or in a fused state. This would mean one-twentieth of an inch of our globe's thickness. Notwithstanding the great mass of heated matter within the earth we receive practically no heat from this source. This is due to the fact that the earth is such a poor conductor of heat. Solar heat is what we have to deal with in our weather phenomena.

Mars, the nearest of our planet neighbors, probably has no atmosphere, and the inhabitants have to content themselves with some other topic of conversation than the weather.

The air on the surface of the earth is commonly said to extend forty-five or fifty miles into space. In fact it extends much farther, but in a greatly rarefied condition. The fact of its existence at such a distance is proved by meteors, which acquire an intense heat by

friction with the atmosphere through which they pass. One-half of the total body of air is probably within two or three miles of the surface.

The existence of the warm belt around the equator produces circulation. Upon this fact the phenomena of the weather chiefly depend. When a body moves from the poles to the equator it has a tendency to be deflected to the right, and when it has passed the equator it moves to the left.

The terms cyclone and tornado are often confused. The tornado is small in comparison and local in its field of operations, extending over a strip eight or ten miles wide, whereas the cyclone may have a diameter of five hundred or one thousand miles. By these we can ascertain the storm centre.

The weather bureau gets a higher credit for forecasting than it really deserves. When it claims a percentage of eighty or ninety in its verifications the facts are not fully stated. Changeable as the weather is, it often remains the same for a week at a time. California has but two great changes in the year, and the officers there get a percentage of ninety-five.

If you want to be called weather-wise predict that the weather will be the same to-morrow that it is to-day. If sure there are to be changes you will often hit it wrong, but if the rule is faithfully followed the predictions will prove true oftener than not. In forecasting there is quite an element of guessing.

It is an unfortunate fact that most of the observations are made in cities and towns. In large cities the smoke and hot air issuing from the tall chimneys heat the atmosphere in the immediate locality, and the department gets false data to work from. There have been propositions to build towers or to send up balloons to secure more accurate observations.

Among the things we don't know about the weather is how to make long forecasts. Efforts are now being made to get forecasts thirty hours ahead. Some people think the department ought to tell what the weather is to be for a month to come.

Weather proverbs have come down from the conditions of objects and the actions of animals. One proverb reads: "Do business with men when the wind is in the north." It is claimed that men are then in a better humor. When cats sneeze it is said to be a sign of rain. When cats are basking in the sun in February they will go to the stove in March, runs another proverb. Cats snoring is said to be a sign of rain.

Another proverb is to the effect that if on Candlemas day the ground-hog comes out there will be snow or rain, and, conversely, if he stays in his hole, it will be fair. This gives rise to the expression of the ground-hog being afraid of his shadow.

Squirrels storing away nuts in large quantities is said to indicate the approach of a hard winter. An authority who has made investigations for a period of twenty years declares there is nothing in it. Squirrels store up an abundance when there is an abundance and it is readily accessible. The saying, "Everything is lovely when the goose hangs high," has reference to the weather. Hangs is a perversion of hawks, and this from honks, meaning that when the wild goose makes his cries high in the air the weather is invariably clear.

There is no relation between the weather and the phases of the moon, in spite of the popular superstition. Some farmers have held to the belief that in certain phases of the moon the lower rail of a fence being laid will sink into the ground, while in others it will remain on top. Some authorities say that when the horn of the moon dips down it will shed water, while others say it is a sign of good weather. The only effect of the moon is its influence on the tides.

A great deal of importance is attached to lunar halos, the rings surrounding the moon, the saying being that the number of days intervening before a storm depends upon the number of stars within the ring. There is something in the rings about the moon and sun as they indicate an atmospheric disturbance which often results in a storm. There is no importance attached to an equinoctial storm. There is no relation between the weather and the equinox.

Spots on the sun are found to grow and diminish. This coincides with the variation of the magnetic needle, showing there is an intimate relation between them. These spots are not weather phenomena. A great deal of undue importance was formerly attached to these cycles, some declaring that they corresponded with large yields of wheat in India, with the appearance of certain diseases, and the prevalence of marriages.

Deforestation does not affect the quantity of rainfall, but has much to do with the distribution. The soil is held together by the roots and this holds the water, which makes the supply of moisture more regular. When the trees do not exist the water runs off more readily.

It is said there has been great changes of climate within a few years. Many think the winters are milder than formerly. This idea is erroneous. The winters remain substantially as they were, but we

are accustomed to bunch together phases of our early experience, and the error is with us. The mean temperature is the same as one hundred years ago.

Students have studied astronomy for the love of the science and not for the money there is in it. Now we are accustomed to give up everything in our weather researches to that which will bring in an immediate return of cash. This is a foolish policy. If the study of the weather is pursued persistently as a science for a few years, it can be made a science.

30th January, A. D. 1896.

ESSAY

BY

Prof. G. E. STONE, Massachusetts Agricultural College.

Theme:—Parasitic Fungi Affecting the Horticulturist.

Two of the most important branches of science associated with Horticulture are botany and entomology. Indeed, what science there is connected with Horticulture belongs wholly to botany, and inasmuch as Horticulture concerns itself largely with matters of function rather than those of structure, it would naturally fall under that branch of botany known as vegetable physiology. But some may maintain that Horticulture is not a science, but an art or a business. This may be true, but this business requires art, which manifests itself in the gardener's skill, and behind this art there are scientific principles which have been unconsciously worked out and closely followed for generations with the aid of that instructor known as intuition. This skill or intuitive knowledge is the most valuable possession which a gardener may lay claim to, and is a form of knowledge which cannot be obtained from either books or colleges, but only by the direct observation of plants. To illustrate more definitely what I wish to infer, I will state that every floriculturist knows that it requires some skill to grow roses, and yet if a novice were to read all the hand-books on the subject of rose-culture ever printed he might not be able to grow a single healthy rose.

In this respect the relationship between the art and science of Horticulture resembles that between art and science in general. If it should happen from any cause whatsoever that all of our knowledge pertaining to the art and skill employed in Horticulture should be suddenly obliterated, and nothing remaining but the scientific principles found in books, any attempt made in the growing of fruit or vegetables requiring skill would result in a bungling affair, and they would hardly be subjects for a premium at a horticultural exhibition

if the same high standards of excellency were required that are in use to-day. It is with no disparagement to science, however, when I state that of the two forms of knowledge the art (which is that in which the gardener excels) is the more important to the horticulturist, yet one may be an expert in one of these branches without knowing much about the other. The excellent motto which the Royal Agricultural Society of England adopted many years ago, namely, "Practice with Science," appears to me to be the best one to follow, and one which has more meaning to-day than at any other time in the history of Agricultural or Horticultural practices, and what holds good to-day will possess more significance in the future, for the resources of scientific inquiry pertaining to Horticulture are by no means exhausted.

It is only necessary for me in calling your attention to this matter to point out a few lines of scientific investigation which have already affected horticultural practices, and which will undoubtedly produce other beneficial results in the future. Of these investigations the study and treatment of plant diseases has been so far as fruitful as any to the horticulturists, and the use of the electric light in forcing lettuce has shown beneficial results.

Valuable results may be expected in the future from the study of plant-breeding, in the improvement of varieties, development of seedless fruits, and a large field is open in the study of the function of plants, or in vegetable physiology, not only for the purpose of being able to grow more healthy plants, but to actually increase their assimilative processes which will result in their greater growth. It is my purpose to consider this afternoon some of the relationships of science to Horticulture as illustrated by fungus diseases. Fungus diseases affecting our cultivated plants have been known and observed from time immemorial. Way back in the deepest depths of barbarism when man first commenced to subdue some native plant, the presence of a smut or mildew was undoubtedly interpreted, as it was a few centuries ago, as the wrath of the gods for some offence. We find, however, in the Old Testament no less than six distinct references to mildews and blasting.* Among the Greeks they are mentioned in the works of Democritus, Theophrastus and Apuleius, and among the Romans references to them can be found in the works of Cicero, Pliny and Horace.

Coming down to more recent times, to the early days in New England, we find it stated by John Josselyn, an early English traveller,

*Gen. xli. 6-27; Deut. xxviii. 22; Amos iv. 9; I. Kings viii. 37.

that there were two diseases peculiar to our fruit trees, which he designated as "Meazels and Lowsiness,"* and there is reason to believe that the corn smut, which never appears to cause a very large amount of destruction, at least here in New England, has probably existed for many centuries, and was undoubtedly a legacy handed down to us by the Indians, and so likewise was the rust and smut of the wheat a legacy from Europe in colonial days, as it has been subject to these troublesome diseases for a long time here in Massachusetts.

Even so far back as 1664 it is recorded that "a greate and dreadful comet, or blazing-star, appeared in the south-east in New England for the space of three moneths, which was accompanied with many sad effects, great mildews, blasting in the Countrey the next summer,"† and about one hundred years later, 1754, "an idle opinion obtained among the vulgar that since the execution of the Quakers [1659] wheat was always blasted."‡

These statements are sufficient to show that the early settlers were much vexed with the presence of plant diseases, and a perusal of the lengthy sermons and prayers of those by-gone days, whose scope was limited only by the horizon of experience, would occasionally reveal to us the sincere pleadings addressed to a Divine Providence for a deliverance from these pests.

It has been believed in New England for a century or more that the barberry bush is in some way connected with the blasting of wheat. According to Dwight,§ "wheat near the barberry was always blasted, and always in the direction of the wind"; and in another place he states: "The barberry bush in New England was generally believed to blast both wheat and rye through the very copiously emitting of a pungent effluvium." It was not uncommon in those days to

Note.—John Parkinson, an old English writer, mentions canker in trees in 1629. He states: "The canker is a shrewd disease when it happeneth to a tree; for it will eate the barke round, and so kill the very heart in a little space. It must be look into in time before it hath runne too farre; most men doe wholly cut away as much as is petted with the canker, and then dresse it, or wet it with vinegar or cowes pisse, or cowes dung and urine, etc., untill it is distroyed, and after healed againe with your salve before appointed."

* The way to cure them when they are lowsie is to bore a hole into the main root with an Augur, and pour in a quantity of Brandie or Rhum, and then stop it with a pin made of the same tree.—*Josselyn Voyages*, 1638-1663, p. 146.

† Josselyn's Voy., p. 206, also pp. 207 and 208.

‡ Neal's Hist. of New Eng., 1754.

§ Dr. Timothy Dwight's Travels in New Eng., 1821, vol. 1, p. 382.

ascribe many natural phenomena as accountable to effluvia. The philosophic though dogmatic Jonathan Edwards* believed that each planet emitted different effluvia, which he conjectured had great influence on plants and animals. We do not wish, however, to go into a discussion of these ideas, or even of the Platonic or idealistic conception entertained by Cotton Mather and others of that time, who believed that everything in the nature of a blight was created for the special purpose of rectifying the unrighteous conduct of wicked men, and that the demonstration of Divine Providence in remarkable mercies and judgments were only the natural rewards of the just. Suffice it to say that the immediate cause underlying these disorders we now well understand, and the pungent effluvium or infectious element referred to on the barberry is nothing more or less than the manifestation of the normal processes of reproduction and propagation which take place in the life-history of the fungus known as Puccinia graminis; and, with due respect to the metaphysical speculations and unphilosophical deductions of our revered though well-meaning ancestors, we must add that it is now generally believed that the blasting of wheat has ever had but little connection with the "great comet or blazing star of 1664," or with the persecution of the Quakers in 1659, but is due to wholly natural causes which manifest themselves in diversified form according to perfectly natural changes of condition in our environment.

The fungous diseases of cultivated plants cause annually an enormous loss to American agriculture, a large proportion of which might be prevented by the use of remedies which are known to be effectual. It is difficult indeed to determine definitely the amount of damage inflicting a certain crop by fungous enemies, especially where we have to deal with large areas, but it is safe to say that in most instances it is much greater than is ordinarily supposed. In some years the blast to wheat and corn alone by fungous diseases in the United States is estimated at $200,000,000, and according to Prof. Burrell the average annual loss due to rust of wheat in Illinois is estimated at one-half million dollars. It is estimated that the average yearly loss of oats in the United States due to smut equals or exceeds one-tenth of the entire crop. According to Prof. Kellerman the loss in Kansas in 1888 was nearly one and one-half million, and in 1889 at about one million; and according to Prof. Arthur the loss in Indiana from the same cause in 1889 was about $800,000, and in 1890 somewhat over

* Life of Jonathan Edwards, 1830, vol. 1, p. 734.

$600,000. The loss which results to fruits from fungous diseases is even greater still. Several years ago Prof. Burrell declared that could the losses due to rots and blights in our fruit plantations be exactly expressed in dollars and cents it would frighten cultivators from their business. The loss of peaches from the brown rot on the Chesapeake and Delaware peninsulas in 1888 was estimated by competent observers at from $400,000 to $600,000, and that annually caused by the so-called peach-yellows must be enormous. It is estimated that four diseases of the orange and lemon cause annually an aggregate loss of fully $250,000, and the loss from apple-scab ranges from one-sixth to one-half the entire product. The strawberry blight in many localities often ruins the entire crop; the rots and mildews affecting the grape have led to the extermination of hundreds of vineyards, and according to a recent report on the new Californian vine-disease the loss has reached within a comparatively short time the stupendous sum of ten million dollars. Many other like estimates might be given, but this I am sure is enough to give us some idea of the extent of the ravages caused by these organisms.

Most of our plant diseases are of recent origin, and the number of new ones which occur—some of which are extremly disastrous—render it difficult indeed to keep pace with the advancing knowledge. For example the orange-blight now affecting Florida has come to public notice only within the last three years. The vine disease of Southern California, which has previously been mentioned, and which blasted so many of its vineyards, was unknown a few years ago. The carnation rust, which was introduced from Europe, was first noticed in this country by Prof. J. C. Arthur about six years ago, and is now causing considerable trouble to our floriculturists. The leaf-spot of the potato was first observed about eight years ago in Missouri. The hollyhock rust was introduced from Europe in 1886. The pear-blight commenced to show its ravages only a few years ago, and the peach-yellow, though well known for many years, has only shown its universally disastrous effects within the last two or three decades; in short it may be said that the greater number of diseases which are peculiar to our cultivated plants have made their appearance, or at least have assumed disastrous proportions, within the last twenty-five years. It is within the last fifteen years however—and the enormous increase in plant maladies seemed to necessitate it—that any serious attempts have been made in the United States to apply remedies for fungous growth, with the discovery and introduction of such fungicides as the Bordeaux mixture, eau celeste, am-

moniacal carbonate, kerosene emulsion, sulphate of copper solution, etc. There has arisen a complete change in our methods of growing fruits and vegetables. Before going into a description of plant diseases let us consider some of the characteristics of fungi in general. The fungi belong, as you all well know, to a low order of plant life, although resembling in their color and mode of life the Indian-pipe, dodder, broom-rape and beech-drops among flowering plants. They either thrive upon the juices of other plants, when they are termed parasites; or else upon decaying organic matter, when they are known as saprophyetes. They contain no chlorophyll or green coloring matter, and hence they are unable to manufacture starch by means of the kinetic rays of the sun out of carbonic acid and water. Instead of giving off oxygen and absorbing carbon dioxide, as is the case with all green plants in sunlight, they continually throw off carbon dioxide, and in this respect their metaholic processes coincides with that of animals. [At this point the speaker briefly referred to the systematic position and mode of reproduction of fungi, which was rendered clear by means of a diagram representing the classification of plants.]

The total number of fungi in the world, according to Barcardo, on a determinate basis is 40,000 up to 1892. The number which probably exist in Worcester County is not less than fifteen hundred. Fortunately, however, all the species of fungi are not injurious. The rose alone is subject to 165 species of fungi, although there are not over half a dozen which cause any serious trouble to growers. About 200 species of fungi attack our cultivated plants, and are troublesome enough to have received treatment. The number of bacterial diseases so far described affecting cultivated plants is about twenty-five.

[The essayist then devoted some time to a general description and mode of treatment of about 35 common plant diseases, which was illustrated by 23 diagrams representing both their marroscopic and microscopic characters. What follow is a condensed and tabulated account.]

Cabbage, Turnip, Cauliflower, Etc.

Club-Foot (Plasmodiophora Brassicæ). Occurs as tubercles on the roots.

Treatment.—Rotation of crops. Also air-slacked lime at the rate of 75 bushels per acre has shown beneficial results.

Potatoes.

Mildew or Rot (Phytophthora infestans). Downy appearance on under side of leaf, and rot in tuber.

Early-Blight (Macrosporium Solani). Small, circular, whitish spots on leaf, usually perforated.

Bacterial-Blight. Develops throughout the plant, which causes it to wilt and die.

Treatment.—Bordeaux Mixture is a remedy for the three preceding diseases. When applied every two weeks it has given an increase of 65 per cent. in the yield over that of the untreated.

Scab (Oospora scabies). Occurs on the tuber as a corky growth.

Treatment.—Soak seed potatoes for 1½ hours in a solution of Corrosive Sublimate in water of the strength of one per cent. or 1-1000 parts, after which allow them to dry, then cut and plant. This treatment kills all of the spores and the solution can be used over and over again. Inasmuch as Corrosive Sublimate is exceedingly poisonous, care must be exercised in handling, and only wooden vessels should be used for the solution. Other preventative measures are: Plant in soil free from scab. Use seed free from scab. Not use manure where scabby potatoes have been fed to stock. Use fertilizers. Dig early. By using these precautions 98 per cent. of the potatoes have been saved from scab.

Tomato.

Black-Rot (Macrosporium Tomato), (Fusarium Solani). Occurs in the fruit in the form of large brownish-colored, decayed spots.

Treatment.—Experiments in which the plants were treated with the Bordeaux Mixture have resulted in a saving of all but four per cent., whereas similarly untreated plants showed a loss of sixty per cent.

Scab (Cladosporium fulvum). Common on greenhouse tomatoes where it occurs as large, brownish or purplish downy spots, on the under side of the leaf.

Treatment.—Bordeaux Mixture recommended.

Celery.

Leaf-Blight (Cercospora Apii). First appears as small, yellowish spots upon the leaves, which finally enlarge and run together, causing the leaves to turn yellow and brown, and eventually killing them.

Treatment.—Grow in moist locality. In case the disease occurs under these circumstances, apply some standard fungicide (Bordeaux Mixture) during the younger stages of development of the plant.

Leaf-Spot (Septoira Petroselini, var. Apii). Characteristic watery spots occur on the leaves, which eventually assume the form of black dots. Common in hot-bed plants.

Treatment.—As in the preceding. Select unspotted seed.

Strawberry.

Leaf-Spot (Sphaerella Fragariæ). Small purplish or reddish spotted leaves.

Treatment.—Spray the plants with the Bordeaux Mixture very early in the spring, and again when the blossoms open. After harvesting the fruit the old foliage can be removed and destroyed.

Pear.

Leaf-Spot (Entomosposium maculatum). Attacks the leaves, stems and fruit. Occurs on the leaves as reddish brown spots which eventually cover large areas, and often defoliating the tree, and upon the fruit as reddish spots which later turn dark. Also attacks the Quince.

Treatment.—Spray with Bordeaux Mixture as soon as leaves appear and repeat the same every two to four weeks, according to weather conditions, until August. If later treatment is required use Ammoniacal Carbonate of Copper one ounce to twelve gallons of water.

Fire-Blight (Micrococcus amylovorus). Characterized by the almost instantaneous dying of the leaves and branches. Also common in the Apple, Quince, etc.

Treatment.—No remedy is known except cutting away and burning the dead branches.

Apple.

Scab (Fusicladium dendritium). Occurs in the fruit and leaves, appearing in the latter as black, circular spots one-half inch or less in diameter.

Treatment.—Spray with Sulphate of Copper when flower buds are swelling, then with Bordeaux Mixture just before blossoms open and again after blossoms have fallen.

Rust (Roestelia pirata). Occurs in both fruit and leaves as bright yellow-fringed, cup-like growths.

Treatment.—Spray with Bordeaux Mixture as soon as leaves appear. One other treatment is sufficient.

Black-Rot (Sphaeropsis malorum). Rotting of fruit.

Treatment.—Same as the two preceding at fruit, but two treatments should be applied after the fruit has set.

For more details connected with spraying, the bulletins issued from the Hatch Exp. Station should be consulted. These are furnished free to all citizens of the State, and contain a spraying calendar, not only for fungi, but for insects.

Peach.

Fruit-Mould (Monilia funtigena). Attacks the fruit, which becomes prematurely decayed, and is covered with an ash-colored mould.

Treatment.—Two or three applications of Ammoniacal Carbonate solutions after the fruit has formed is usually sufficient.

Cherry.

Fruit-Mould. Same as Peach.

Plum.

Fruit-Mould. Same as Peach and Cherry.

Black-Knot (Plow-right-in morbosa). Large black excrescences on the branches.

Treatment.—Very early and subsequent sprayings partially control it. Kerosene emulsion will destroy the half-mature knots should they appear. Mature ones should be removed with the branches that bear them.

Grape.

Downy-Mildew (Peronospero Viticola). Downy whitish areas on under side of leaf.

Powdery-Mildew (Uncinula spiralis). Whitish powdery spots in young shoots and upper surface of the leaves.

Black-Rot (Laestadia Bidwellii). Attacks most disastrously the nearly mature fruit, which becomes spotted and shrivelled.

Anthracnose (Spharelima Ampelinum). Attacks the leaves, stem and fruit. Appear as circular brownish dots, with purple margin and whitish centre.

Treatment.—Spraying with the Bordeaux Mixture three or four times during the season has proved very successful for all diseases of the grape. The first application is made before the buds unfold, the last when the fruit has set. Further treatment consists in one application of Ammoniacal Carbonate of Copper at the time when the fruit commences to color.

Rose.

Black-Spot (Actinonema Rosæ). Characteristic blackish spots on the leaves, whitish margin.

Treatment.—Sulphate of Copper checks the disease if applied early.

Mildew (Sphaerothua pannom). Whitish mildew growths on the leaves, which causes them to curl.

Treatment.—Sulphur fumes, and also as a powder is most frequently used.

Rust (Phungmidium muconatum) and (P. speciosum). Common on outdoor roses.

Treatment.—Spray with Copper Sulphate very early in the Spring. Subsequent treatments can be made with Bordeaux Mixture.

Carnation.

Rust (Uromyus canjophyllium). Attacks the leaves very disastrously. Easily recognized by the elongated ruptured areas containing reddish spores.

Treatment.—No good remedy can as yet be recommended. Although whatever treatment is applied it must be made before the rust has made its appearance. Much trouble can be saved by selecting unsusceptible varieties.

Two other diseases are common in the Carnation which are known as Anthracnose and Spot. What is stated under treatment for the Rust applies here also.

Dumping Fungi (Pythium De Baryauum) and (Botrytes vulgaris). These fungi are very common in hot-beds and greenhouses. They can very largely be controlled by conditions of temperature, light, and moisture.

6th February, A. D. 1896.

ESSAY

BY

Miss SARAH E. DOYLE, Providence, R. I.

Theme:—The Highest Mission of a Horticultural Society.

Mr. President and Members of the Society.—This city is to be congratulated for having a Horticultural Society whose members are interested in the objects for which the Society is established, and willing to devote time to the advancement of its interests. By its efforts the wilderness and the solitary place may be made to blossom and become sources of pleasure to the eye and health to the whole body. Certainly one mission of such a society is accomplished, if the common fruits by cultivation develop into the finest specimens of their species, if new hues and charms are added to the flowers that have bloomed in wild luxuriance by the wayside.

Beautiful and delicate as the wild rose is, we do not feel like paying homage to it, as its cultivated and queenly relative, the "American Beauty," almost incites us to do. Our mother Eve would not be regarded as so weak, if the apple offered her had been the Rhode Island Greening, which indeed might have been a temptation. That, however, has never brought woe into the world. How could it? The value of constant effort directed to make every fruit, every vegetable, every flower, as perfect as man can by study and work produce, should be recognized and appreciated. It is one of the evidences of man's kingship over the material things of the earth, for the skilled florist to be able to have, as it were, a magic wand which he but waves over the common and ordinary plants for them to change, so that they gladden and delight by their exquisite beauty.

Looking upon the exhibition of a horticultural society, where rare and graceful ferns rest the eye, where gorgeous chrysanthemums awaken admiration, where the queen of flowers—the rose—makes us linger in her presence, we ask whether the imagination of a Milton

could picture fairer flowers for Eden! If such results come from the influence and instruction of a horticultural society, is there no other mission within its sphere of work? The answer is that it ought to foster a wider love of the beautiful than exists, for the sake of beauty, and not for the sake of dollars and cents; it must aim to educate the young to enjoy and to work for flowers; it must quicken all to the spiritual significance of nature. The world is given over to the worship of the material things which conduce so largely to bodily comfort and luxury. We need not go the extent of Ruskin in denouncing the introduction of machinery, but we do need to strive to overcome the tendency of looking at things from a purely mercenary point of view. What better way can this be counteracted than by cultivating a love of nature in all its manifestations. To but few is it given to visit the grand and beautiful places of the earth—for *all* flowers bloom by the wayside and in gardens, speaking a language known to him who loves them. The highest mission of a horticultural society is to lend its strongest influence to the educating of children to a love of flowers which will lead them to be willing to give time and labor for their cultivation.

At a horticultural exhibition we see the rarest plants which the conservatories of the wealthy can obtain, the products of hot-houses, whose owners, for the sake of business, vie with each other in displaying the results of their skill. Their rare exotics adorn the tables of the rich, or the weddings of the millionaires; while the lilies or violets that ought to bloom only for those who love them are used to assist in a vulgar display. Rarely at these exhibitions is there any place for flowers that have been watched and cared for by some tender lover, for whom "beauty is its own excuse for being"; or if such are sent they seem out of place by the companionship of their more gaudy and imposing relatives. Committees that award the prizes look upon them very much as "poor relations" are regarded in society. Rather should they be placed in a section where they do not apparently suffer by comparison, and where the contributor may feel that humble efforts in flower culture are appreciated and encouraged. A beneficent work for this Society to do is to publsh lists of plants that will grow in small yards where conditions are unfavorable for many varieties of plant life, and yet where children by care and labor could make some flowers grow. It can do more than this—it can urge upon those favored by fortune to give from time to time rose-bushes and hardy shrubs suitable to grow in dooryards to such children and adults who would show sufficient interest to care for them. Doubtless many a florist

throws away cuttings that distributed through the right hands would be the means of brightening many a home. If the children of this community learned that this Society offered prizes for gardens cultivated by them in common places, that a committee would visit these yards to judge of the work done, it would be an incentive to many an idle boy or girl to devote time to gardening, that otherwise would be spent in what can be characterized by no other word than "loafing." The improvement in the grounds of our railroad stations in country places is due to prizes, and though it would be a higher motive for the station master to make his grounds attractive from a love of the beautiful rather than for a prize, still to the looker-on the lesson is taught that gardens are possible even in unpromising situations and are enjoyable. A society that undertakes such work as has been suggested must have a committee that would enter upon it sympathetically, assisting the amateur gardeners by advice, by judicious gifts of plants, by heartfelt encourgement. It is not denied that many children may not care to have gardens, that there is little time for those whose lives are largely given to drudgery to do more than labor for their daily needs; but these conditions do not lessen the responsibility of those who having leisure, and plants that they can give away, in not making efforts to gladden the eyes of those whose outlook is often but barren yards disfigured by rubbish.

In a shady yard I have seen the roadside ferns, the osmundas, the onaclea, varieties of the aspidium and of the asplenium, the maidenhair, the common polypodium and others grow in great luxuriance, adorning what otherwise would have been a barren spot, for the place was too shady for grass. When once a fern garden is commenced, every walk in the country gives opportunity for adding to the varieties already collected, and the enlargement of the garden becomes a fascinating pursuit. In a section of my own city, traversed by many working people, an attractive garden caused them often to stay their steps to enjoy its flowers.

That garden was the direct result of the influence which a neighbor's well-cared-for grass plat exerted upon a boy. His family, caring nothing for the beautiful, bent their energies to performing only the work of life. The boy observed his neighbor's dooryard to be different from his. Its attractiveness made him willing to work to make his dull surroundings pretty. In time a lovely garden and fruit trees rewarded his labors, and better than that lifted the boy out of the common and coarse into the realm of the beautiful.

Do not, then, members of this Society, believe that you are doing

all that can be done for horticulture when you confine your efforts to your wonderfully beautiful exhibitions, but extend your work until wherever in this city the sun's rays fall upon a spot of ground uncultivated and suitable for plants, *they* shall be found growing, filling the air with fragrance in summer, and covering unsightly places with verdure for many months in the year.

In crowded neighborhoods idleness is hand in hand with brutality. Do we not believe that the youth who will care for flowers will be unconsciously refined, and will learn that in leisure moments there is something interesting to do?

One worthy example in a neighborhood will often renovate it. Matthew Arnold wrote that "no one looks on, seeing his neighbor mending without asking himself if he cannot mend in the same way."

It is often alleged that the busy man or woman has not time for gardening; or that those of limited means cannot afford the cost of seeds and plants. Let me describe a garden that has interested me to refute both of the objections given above. The owner has taken at the end of his yard a plat of ground about 10 feet by 80. Instead of dividing into beds for the sake of making an ornamental display of plants, he has held before him the ideal of raising flowers to enjoy, and to cut for his family and friends. The space allotted to the flowers is simply divided into beds by narrow paths for the sake of convenience. The seeds are planted in drills, leaving space between each drill wide enough to admit a small hoe. This enables weeding to be done by hoeing between the drills, so that seldom is my informant compelled to get down on the ground for that purpose, which, it must be confessed, is fatiguing work. His expenditure for seeds for that garden does not exceed five dollars a year. The time he has given to the garden between the middle of April and the first of September is fifty hours. In that number is not included the time devoted to the cutting of the flowers or tying up plants, for that is usually considered pleasant. It is what is counted as hard work that is included in the time given. There are few persons who can assert that they have not spent that number of hours in ways that have brought no lasting results, either of healthful pleasure or mental benefit. One small plat 4 feet by 12 was devoted to raising single poppies. Along the borders of the bed were placed stakes 16 inches in height with a nail in the top of each, by means of which a coarse wire netting was held in place over the bed, through the meshes of it the poppies came up and were held in place. As the time for them to cease blooming drew near, nasturtiums were transplanted to the borders of the bed, so that

their flowers replaced the poppies. A record of the number of poppies picked during the season was upwards of two thousand. Though this flower is evanescent, the variety and beauty of coloring make them attractive bouquets for the house. Along the boundaries of my friend's lot are rose-bushes and other shrubs, making the number of different plants in his yard almost one hundred and fifty. One hedge is very beautiful during the fall, for it is a mass of the white eupatorium and the wild purple aster. To obtain these no money was essential, but a pleasant walk in the country secured the roots.

It is a pleasure to find in this garden the favorite flowers of years gone by, such as balsam, marigold, hollyhock, larkspur, sweetwilliam, violet, pansies, petunias, portulacca, sunflower, cockscomb, zinnias, sweet peas, morning glory and asters.

When we take the estimates of the papers of the hundreds, nay thousands, in every city who spend many hours watching athletic games, we cannot accept want of time as a reason for not gardening, or walking in the country to enjoy nature's panorama.

A horticultural society can teach that one of the highest forms of physical exercise is gardening. The argument is advanced that athletic games are highly conducive to health. Grant that they are, it cannot be denied that there is often attendant upon them an ungenerous rivalry, a tendency to betting, an unhealthy excitement. The handling of the shovel, the rake, the hoe, gives exercise from which there can result no evils, but rather a positive gain to both mind and body. An athletic game has no material results to show for the benefit of others; but he "who makes two blades of grass where one grew before," can view with satisfaction the results of his exercise, and justly feel he has contributed to others' good. Moreover, gardening gives enjoyment that need not be dropped as age comes on, for as long as strength endures, it is a resource that never fails to give pleasure.

The physical benefit of gardening has been dwelt upon, but even higher than that is the mental refreshment it gives. The man harassed by business, the woman exhausted by the wearying demands made upon her, will find the thoughts turned from monotonous channels to brighter ones, and will be healed and made glad by the freshness of nature.

The experience of a business man, who for more than fifty years gave his leisure to a garden, gave it, too, in early manhood, when time meant money, for he was building up a business, proves that the writer is not theorizing, but describing an actual case. When the

perplexities and cares incidental to life vexed his soul, if not forgotten, they ceased to harass as he worked in his garden, or went forth into the woods and fields to enjoy the procession of flowers. Their haunts were shrines too sacred to be touched with other than reverent care. Rare wild flowers bloomed in his own garden, brought mostly from the different parts of the State. The anemone, dogtooth violet, Dutchman's breeches, hepatica, white and purple trilliums, columbine, the yellow variety of the lady's slipper, rare and delicate ferns, shy orchids, gladdened the eyes of all whose souls are touched by "the darlings of the woods."

To the nature of such a lover of plant life each returning spring was a new creation, awakening admiration and delight that knew no diminution after fourscore years had passed. What would not any one give to possess such a never-failing source of enjoyment? Need we idly wish for it when to a considerable degree it lies in the power of almost all to have it. It must be acknowledged that it means overcoming a certain amount of laziness perhaps, or indifference; but the best things of life do not come to us without effort. When we gain them, then the reward is so great that it dwarfs any exertion made for their attainment.

It must not be forgotten that the cultivation of flowers is an unselfish pursuit, for it tends to encourage friendly relations between neighbors; it tends also to create the desire to make others sharers in the results of the garden.

The purest pleasure arises from the love of nature. It makes existence even in hard circumstances less dreary, raising the life farther from that of the animal, and nearer to that of the man, who is kin to the angels.

A lesson that horticulturists ought to teach children and their elders is respect for plants. When spring comes, its charms tempt the young into the fields and woods, where, with reckless disregard of the future, they tear up wild plants, often exterminating species. In my own city botanists refuse to reveal the haunts of wild flowers, so much destruction has already been done by careless ramblers. Teachers, by directing the attention of children to the delight that comes to all by the beauty of woods and fields, where there is a profusion of wild flowers, might assist in awakening an interest in the preservation of them.

Doubtless it would have been more interesting, perhaps it might have been considered more worthy of this occasion, had I brought to you descriptions of celebrated gardens of old, or of the triumphs of landscape gardening to-day. It is indeed interesting to read of a magnificent

garden in Tuscany, where, surrounded by box hedges, bloomed imperishable blossoms made of—pebbles and chalk!

It is curious to recall descriptions of old English gardens, where there were monsters, giants, animals, coats-of-arms, mottoes, cut in holly, yew and box. This fashion went so far that a London gardener offered to cut "the effigy of any lady in myrtle." Even Adam and Eve were offered cut in a yew tree; Eve had the serpent with her.

The practical nature of my talk forbade any attempt to amuse. The lesson to carry away is that no garden that is an elaborate work of art or great in extent can awaken the delight and show the fondness for flowers as does one tenderly cared for in a dooryard. Where the Garden of Eden was is a disputed question, but he that loves flowers and has a garden has his own Eden.

We may be thankful that while fashion may control the arrangement of flowers, may even proclaim one to be more the style than another, it can never spoil their beauty.

To me there is greater satisfaction in dwelling upon the beauty of plant life than upon that of any other manifestation of the beautiful, for its enjoyments are not limited to any class.

Rare jewels, fine pictures, are the possession of the few; the lover of flowers can have his own garden. It may be but a few plants, yet by those his senses and soul are stimulated. It is because I believe the truth of this principle, that I have ventured to present to you, members of this Society, accomplished and skilled horticulturists as you are, my plain, practical suggestions, trusting that you will feel that there are still opportunities for greater enlargement of your work.

13th February, A. D. 1896.

ESSAY

BY

E. H. FORBUSH, Director of Gypsy Moth Work, Massachusetts Board of Agriculture.

Theme:—Injurious Insects.

When man first began to till the soil with a view to cultivating such plants as would be useful in furnishing food he instituted many changes in his relations with the material world. By removing or destroying certain plants which cumbered the ground, and planting and cultivating others, he began to disturb the balance of nature. Many animals which had before been considered beneficial or neutral to his interests became his enemies. Especially was this true of those animals which fed upon his crops, and of these the vegetable-feeding insects soon became the most important because the most difficult to deal with. To learn how to destroy or hold in check insects which are injurious to crops has always been one of the aims of the agriculturist, and this is especially true in a country like our own, which is of comparatively recent settlement.

A considerable proportion of the land in America is still uncultivated, and there are vast tracts in which insects can breed unmolested until they exhaust their feeding-grounds and overwhelm the surrounding country, as in the case of the migratory locusts. In the settlement and development of a new country, man at once begins to disturb the long-established relations between living organisms. In a wooded country the forests are cut off, the larger birds and mammals are exterminated or driven away, and great disturbances occur in the economy of nature as a consequence of these changes; new plants are introduced, and with them new insect pests are brought in from other regions or from foreign countries. As civilization advances large areas are devoted to special crops, like the great grain farms of the

northwest, the orange groves and vineyards of California, and the great orchards and potato fields of other States. The tracts offer great quantities of desirable food, and thus stimulate the reproduction of insects to a remarkable degree. The spread of imported species to the very confines of civilization is accelerated by an ever-increasing traffic on newly constructed highways and railways, and as these imported insects escape most of their natural enemies by being brought to this country, and find more favorable conditions awaiting them here, their fecundity and destructiveness are increased in undue proportion even to their increased food supply. Such are the cabbage butterfly, the wheat midge, the Hessian fly, the gypsy moth, and others. Native species which were harmless to agriculture under natural conditions in the wilderness sometimes take advantage of the introduction of a new and succulent food-plant and follow it back from the frontier into the agricultural regions, spreading over the whole country, and causing widespread injury to a staple crop, as did the Colorado potato beetle. Man also destroys his friends, the insect-eating animals. As the land becomes settled and the ravages of insects increase, the settlers, instead of endeavoring to protect and foster the useful birds that were designed to dispose of the surplus insect production, pursue them until the larger useful species are nearly if not quite extinct. The wild turkeys, grouse, prairie chickens, wild pigeons, ducks and geese, plovers, woodpeckers, blackbirds, larks, robins, and all birds which are "good for food," are slaughtered relentlessly, even at the season when the callow young must perish from starvation if deprived of parental care. The grasshopper-eating buzzards and all hawks and owls are shot at sight anywhere and everywhere by all classes of people.

While all this is going on insects increase apace. The number of species of insects upon the globe is vast. The number of individuals is beyond all comprehension. The reproductive capacity of insects is such that could a single species be allowed to increase without check its progeny would soon cover the habitable earth. The following statement by Dr. J. A. Lintner, the distinguished entomologist of the Empire State, illustrates the maximum reproductive capacity of an insect:—

"Professor Riley in his recent studies of the hop vine aphis *(Phorodon humili)* has observed thirteen generations of the species in the year. Now, if we assume the average number of young produced by each female to be one hundred, and that every individual should attain maturity and produce its full complement of young (which, however, never can occur in nature), we would have as the number of the

twelfth brood alone (not counting those of all of the preceding broods of the same year) 10,000,000,000,000,000,000,000 (ten sextillions) of individuals. Where, as in this instance, figures fail to convey any adequate conception, may I ask you to take space and the velocity of light as your measures? Were this brood as above given marshalled in line with ten individuals to a linear inch, touching one another, the procession would extend to the sun (a space which light travels in eight minutes), and beyond it to the nearest fixed star (traversed by light only in six years), and still onward in space beyond the most distant star that the strongest telescope may bring to our view, to a point so inconceivably remote that light could only reach us from it in twenty-five hundred years."

The voracity of insects is enormous, and the amount of food they can consume and digest is almost beyond belief. Kirby and Spence tell us that "Many caterpillars eat daily twice their weight of leaves, which is as if an ox weighing sixty stone were to devour every twenty-four hours three-quarters of a ton of grass." Dr. Lintner says "A certain flesh-feeding larva will consume in twenty-four hours two hundred times its original weight; a parallel to which, in the human race, would be an infant consuming, in the first day of its existence, fifteen hundred pounds of nutriment. There are vegetable-feeders, caterpillars, which, during their progress to maturity, within thirty days, increase in size ten thousand times. To equal this remarkable growth a man at his maturity would have to weigh forty tons. In view of such statements need we wonder that the insect world is so destructive and so potent a power for harm."

It may be truthfully said that this country suffers far more from the depredations of insects than any other; and this is to be expected in view of the methods employed in agriculture and the conditions under which it is here conducted.

Insects have seriously affected the agriculture of many States. The Chinch bug is said to have done an injury to the agriculture of Illinois amounting to seventy-three million dollars in a single year. The cotton worm has destroyed a considerable portion of the cotton crop nearly every season until within quite recent years, and this damage has been estimated at from twenty-five million dollars to fifty million dollars annually in the cotton States. It is said that in Massachusetts from seventy-five thousand dollars to eighty thousand dollars is expended yearly to stay the ravages of the potato beetle, and the total cost of fighting the potato beetle in the United States is estimated at two hundred million dollars annually. The damage done to agricultural products in the United States by insects has been variously estimated during different years within the last half century at from two

hundred and fifty million dollars to four hundred million dollars annually. Professor James Fletcher, entomologist to the Canadian government, places it at three hundred and eighty million dollars.

In considering the means to be used in combating injurious insects, it first becomes us to inquire what means are used by nature to regulate the increase of our insect enemies and to hold them in check. Although meteorological and climatic conditions play a considerable part in the regulation of insect increase, the principal means provided by nature for this purpose are (1) the various forms of animal life which prey upon insects; (2) certain bacterial or fungoid diseases. While little can be done by the farmer to foster and direct the increase of useful insects which prey upon other insects, while he is unable to direct or control the diseases which serve to hold injurious insects in check, he can do much toward fostering and protecting the vertebrate animals which prey upon insects, especially the birds. Birds appear to be especially designed to hold our insect foes in check. Their peculiar structure, their powers of vision and flight render them particularly adapted to this work. Their appetites and digestive powers are second only to those of insects. Audubon says a woodcock will eat its own weight of insects in a single night. Professor Treadwell shows that it was found necessary to feed a young robin forty-one per cent. more than its own weight in worms in twelve hours to insure its healthy growth and development; that it would consume nearly half its own weight of beef in a day. A man at this rate would eat about seventy pounds of flesh daily. Professor Wood estimates that a man would have to consume in each twenty-four hours, sixty-seven feet of a sausage nine inches in circumference, in order to eat as much in proportion to its bulk as the redbreast whose daily food is considered as equivalent to an earth-worm fourteen feet long.

Ornithological and entomological publications relate many instances of the usefulness of birds. Instances are given where trees and crops have been saved from destruction by the timely arrival of flocks of certain species of birds who have destroyed the insects. During the locust invasions in the west many fields of grain, vegetable gardens and other crops were saved by birds which destroyed the "hoppers" before they had attained sufficient growth to do much injury. When the Mormons first settled in Utah their crops were saved from the devastations of the mountain crickets by the timely arrival of flocks of gulls who destroyed the crickets.

Many of the worst enemies of agriculture are held in check by birds, and wherever these birds are destroyed the insects increase. Birds

undoubtedly destroy some beneficial insects, but the proportion of beneficial insects to injurious ones is exceedingly small.

In speaking of the gypsy moth *(Porthetria dispar)*, Mr. Forbush said that it was undoubtedly the most serious pest which had ever been introduced into Massachusetts from a foreign country. Its introduction into Medford, Mass., by an experimenting Frenchman is well known. Although his attempts at breeding a hardy silkworm were a failure, he has given us the gypsy moth, which is certainly one of the hardiest insects in the country. The caterpillars of this insect have been placed experimentally in a temperature of forty degrees below zero and have survived the test. They also survive the greatest summer heat.

This insect is an illustration of the increased injuriousness of introduced species. Though unlike many other introduced species it was considered a pest in its native country, it has given evidence of greatly increased destructiveness in this country.

European authors inform us that this insect has been a great scourge in many parts of Europe during the last century and a half; that the sickening and death of many trees has been attributed to it; that its ravages are still very extensive in certain parts of Europe, especially in Russia, where in recent years it has been very destructive in many provinces. In 1879–80 these caterpillars multiplied in frightful numbers and spread over an immense territory in Russia equal to nearly all our Atlantic States. They attack not only forest trees but fruit trees and nearly all kinds of vegetation. They have been particularly destructive in the forests of Russia during the past two years, having devastated large tracts. Their introduction into Massachusetts was forgotten or unnoticed for some years. After they had become acclimated they increased with great rapidity, destroying the foliage of nearly all kinds of trees, plants and shrubs, eventually killing many trees, destroying garden crops, spreading over a great portion of the town and scattering in the meanwhile into other towns in the vicinity. They not only destroyed vegetation but invaded the houses, covering them so that in some cases it is said the color of the paint on the houses could not be distinguished. In spite of all that was done by the citizens and finally by the town authorities to hold them in check, they increased so that the Legislature was called on to aid in the attempt at their extermination. The work, which was at first placed in the hands of a special commission, was afterwards delegated to the State Board of Agriculture, which has carried it on for four years. This work has been successful in so

far as it has greatly reduced the number of insects and the extent of territory infested by them. More than one third of the territory which was found infested in 1891 has been thoroughly cleared of the moth. The great difficulty which the Board of Agriculture has had to contend with in the work of exterminating the moth has been that their recommendations to the Legislature for the past three years that an appropriation be granted sufficient to do all the work that could be done economically each year, have gone unheeded. Each year the appropriation has been reduced one-third to one-fourth less than the amount recommended. The appropriations have also been so delayed that the caterpillars have been allowed to hatch and spread to some extent each spring before the work could be begun. In the progress of the work it has been conclusively proved that the moths can be exterminated from any locality, no matter what the situation or the difficulties to be overcome. More than a thousand separate and distinct colonies of the moth have been wiped out of existence.

As the female moth cannot fly, there can be no extensive spread of the moth until its numbers become so great that the caterpillars are carried out of the infested centres in all directions by vehicles and pedestrians upon which they fall.

Those who are fully acquainted with all the facts in regard to the work believe that the Gypsy moth can be exterminated if sufficient means can be provided by the Legislature for a term of years. If this is not done, there can be no hope of the extermination of the moth. If insufficient means are provided, it will be impossible either to exterminate it or prevent its spread, and it will undoubtedly be distributed not only over Massachusetts but the greater portion of the United States.

20th February, A. D. 1896.

ESSAY

BY

CHARLES GREENWOOD, Worcester, Mass.

Theme:—Family Vegetable Garden.

Mr. President, Ladies and Gentlemen.—After listening to the address of the President, to the able paper on the adornment of the home grounds, to the scholarly talk on the forces of nature as they affect the weather, to the interesting and instructive paper on the highest mission of the horticulturist, to the learned professors in their masterly presentation of facts concerning fungus and insect life that affect all vegetable life, it seems like a fearful drop from these dizzy heights to the common every day work of the farm and the consideration of "what shall we eat." But this habit of eating, though an expensive one, has in all ages been found necessary to stimulate the mind for scientific study, as well as to nourish the body for the full enjoyment of the choicest productions of the horticulturist's skill. And so, perhaps, it may be well for once during the winter to consider the family vegetable garden, from which may be had, from early spring till late autumn, so much to gratify the taste and minister to the health and happiness of all. After learning of the mavellous reproductive powers of both fungus and insect life, and the rapidity with which vegetation is destroyed by their withering touch, it would seem well-nigh impossible to secure anything desirable as a reward for our labor. But, fortunately for us, there are many natural causes that at times prevent the full development of these pests, and what is far more to our credit, we have learned by experience, observation and study to protect ourselves against their ravages, while the chemists have by study and experience placed in our hands various insecticides and fungicides for their destruction. One of the most important things we have learned is that, in vegetable as well as in animal diseases, prevention is better than cure. That, as in the animal kingdom, either in the brute creation or the human family, the surest way to guard

against epidemic disease is to carefully observe the laws of health, keeping the digestive organs in healthy action, so in the vegetable kingdom we should study carefully the natural conditions under which the different plants grow to perfection, and aim to supply those conditions as far as possible. The family garden is in many cases the most neglected part of the farm, and the excuse is often made that it don't pay; that the vegetables used in the family can be bought cheaper than they can be grown. This to a certain extent is true, but it is true only so far as we are able to grow something else that will bring more money than the vegetables cost. No one, who is dependent on the income of his farm, can afford to neglect the garden simply because he cannot realize big pay for the time expended. If the vegetables are grown they are to be had for the gathering at any time, and the satisfaction of having choice vegetables in their season of one's own production should be worth something to any man. If they are not grown the family must go without, or good money be paid for less desirable goods. Every garden should have a good bed each of asparagus and rhubarb; they are both to be had early in the season before spring-planted crops are ready. The good qualities of both are too well known to need any description. The former being an excellent substitute for peas, which are so universally popular, and can be had continuously for five or six weeks before peas are ready, and the latter follows closely on the late-keeping apples, so that we are not wholly dependent on dried fruits. These crops will both bear a great deal of kindness in the way of manuring, and should receive a heavy dressing each year. In setting the asparagus roots the land should be heavily manured and thoroughly and deeply plowed; make the rows four feet apart and the plants two feet apart in the row; cover the roots six inches deep, so that the manure and fertilizers can be harrowed or cultivated in without disturbing them. For rhubarb, make the hills four feet apart and put a wheelbarrow load of manure to a hill. Give the garden a heavy dressing of stable manure in the spring, then as the early crops are removed apply phosphate for the late ones. In arranging the garden, I would, as far as possible, have the different crops in parallel rows the entire length of the garden so that as the early crops are removed the ground can be more easily prepared for the later ones. Though I well remember that as a boy I preferred to have the rows run the short way and but few of them.

A bed of dandelions, though seldom seen in the family garden, would be found very desirable and could be had earlier than the native ones. Josh Billings once said of the dandelion blossom, that he didn't

know as it had any special mission in the world, but it came at a time of year when people were "hankerin" for something "yaller." So with the plant, it comes at a time when people are hankering for something to use vinegar on. In the family garden the question of earliness is not as important a factor as in the market garden, where a day or two makes a great difference in the price, but certain rules apply equally in both cases. All of the most hardy vegetables will not only be earlier, but will produce better crops by early planting. It is a mistake to say there is nothing gained by putting seed into the ground until it has got warm. Spinach, lettuce, onions and peas all germinate at a low temperature and all do the best while the ground is moist and comparatively cool, and should all be planted as soon as the ground is dry enough to work; none of them are injured by freezing after they break ground. In the family garden a wider range of varieties may be indulged in than in the market garden, though in many cases the best for market will also be found best for home use. In spinach, the round, thick leaf has proved the most satisfactory with me. In the last few years there has been considerable trouble with spinach running to seed early; it would be better to pay an extra price for selected seed than to take any chances with the common quality. In lettuce, the Black Seed Tennis Ball is as good as there is; to this might be added the Hanson, Boston Curled and Imperial Head; the latter is a bronze lettuce and is of very fine quality. The Boston Curled is very attractive to the eye, but for table use a little will go a good ways. Of onions, the Yellow Globe Danvers is a standard sort, but the Cracker is preferred by many for family use. The potato and the top onions are excellent varieties and mature much earlier than those from seed. For spring and early summer use, the small onions of the previous season's growth may be set out as soon as the frost is out of the ground, and in a few weeks will be fit to pull. The small onion sets put out at the same time will succeed these and keep up the supply till those from seed are ready.

Of the early peas there is but little choice, all of them being about the same thing under different names. I have found the Alaska the most satisfactory. These differ from the other early peas in that the dry peas are green instead of yellow and the pods are a brighter green, resembling more closely the later varieties. The early varieties, though not as nice as the later ones, will be found very good if used when about three-quarters grown, but if allowed to get full grown you will not be in a hurry for the second mess, unless you are very fond of peas. For a second early, McLean's Advancer takes the lead; they

may be grown without bushing, the pods are of good size and the peas are remarkably sweet and tender. Where the room is limited the American Wonder will be found desirable, as it can be planted close, being very dwarf, and is of fine quality. For late peas the Champion of England, Telephone and Heroine are among the best. Beets are a very desirable crop, and have come to be about as staple as potatoes. There are a great many varieties, but none better for the first crop than the Crosby Egyptian, being very early, of good shape and dark color. The Surprise is a new beet, but which I tried last season with very satisfactory results; it is the most rapid growing beet I have ever seen, is good shape and of fine quality, but is light colored. As a rule the light colored ones are the sweetest, but there is a great deal in looks, and when we have beets we prefer to have them "red as a beet." For the fall and winter crop the Edmands and Dewings are the best. No garden would be complete without a good supply of wax beans, and here I should discard the large, flat-pod varieties that are most profitable for market, and grow the round-pod black-wax, they being of better quality. For later use plant the black-wax pole, which is by far the best of all the wax beans I have ever tasted. For shell beans, the bush Horticultural and Rhode Island half-bush for early, and the pole Horticultural, Concord and Lima for late. The Concord, though not as attractive in appearance as the Horticultural, is of better quality. Cucumbers are highly prized in the heat of midsummer, and there is no better variety for home use than the white spine, the favorite market sort. These should not be planted till toward the last of May, when the ground has become warm and danger of frost is over. They may be had by planting them in pots early in May and transplanting them to the garden the last of May or forepart of June. Water them well before transplanting and they can be taken from the pots without injury, and if transplanted in a bright, warm day, shading them for a little while in the middle of the day for a few days there is but little danger of losing them. Never transplant cucumbers on a cool, cloudy day. Pickles are highly prized in every family, and the Boston pickling cucumber is the best for this use. Of late there has been considerable trouble in growing this crop, which used to be a very sure one. I have never tried spraying the vines, nor have I known of anyone who has been successful in doing so. My experience and observation have taught me, that the troubles, whatever they may be, usually come on early in September (sometimes earlier). To insure a crop I would plant them early enough (say by the 15th or 20th of June) so as to get the crop before Sept. 1st.

This of course brings them into market at the time when people who can afford it are away on their summer vacation, and they do not meet a ready sale in the market, and when the people return in September the pickles are gone, and scores of families are deprived of what might have been had in abundance in August. There used to be no trouble with the vines bearing till frost killed them, but that is changed now, and until there is something invented to *cure* the disease the best thing to do is to *avoid* it by securing the crop in August, the time when the natural conditions are the best for the production of this excellent vegetable. Sweet corn is perhaps as universally used and highly prized as any of the long list of vegetables, and in favorable locations it will pay to plant a part of the earliest crop the last of April or first of May, delaying the main planting till May 10th. The First of All, Corey, Marblehead and Minnesota are the best early varieties. For the second early the Crosby is the best, and for the family garden I would make successive plantings of this for later use; the ears are twelve-rowed, of good size, and very sweet, while the stover is quite dwarf, making it more desirable for the limited area of the garden than the large-growing late varieties. The tomato, in spite of the newspaper paragraphs that occasionally go the rounds to the effect that they cause cancers, has steadily grown in popular favor. This scare is on par with the recent great scare in regard to tuberculosis in cattle, and while the people will continue to keep their ears close to the ground to catch the teachings of science, until science or practical experience, one or both, can show some conclusive proof of disease from these sources we will continue to use both tomatoes and milk. The Atlantic Prize and Early Ruby are the earliest, but I would not recommend them for the garden, as they are of inferior quality; they will do for early market, where earliness counts for money. The Acme or Dwarf Champion are but little later, and the quality is of the best. The First Choice, sent out by S. D. Woodruff & Sons of Orange, Conn., is very much like the Acme, but I think is an improvement on that old favorite. I have grown it exclusively for the last two or three years with very gratifying results. A few hot-bed sash will be found very useful to grow the tomato plants, as well as for lettuce, peppers, celery, &c. If you buy your tomato plants don't try to save a few cents; buy strong, stocky plants, that are well budded, or even in blossom, if you can get them. A great many fail to get enough tomatoes for home use simply by buying poor weak plants that are worth hardly as much as seed planted in the open ground. Don't waste any time or money in making trellises for tomatoes; let them spread on the ground, they

will ripen earlier and be of better quality, and above all don't be foolish and think you know more about ripening them than nature does and go to trimming the vines. Who that has ever been into the fields to pick blackberries does not know that the largest, blackest and sweetest berries are found in the shade, or that the delicious strawberry is ruined if exposed to the direct rays of the sun. What is true of the fruits is equally true of the tomato, and the sweetest and best colored ones will be found under the vines where the sun does not strike them. Never set the plants in the shade, but let the fruit have the shade which nature provides for it in the plant. By cutting off the vines and letting the sun shine directly on the green fruit it is sunburned and utterly ruined. As the season advances the vines are gradually separated and flattened down, and the fruit is exposed, but, as this is done gradually, it does not sun-burn, but is not of as good color or quality as it is early in the season. For squashes the Summer Crookneck, Marrow, Essex or Warren and Hubbard will make a succession from early summer until spring.

Celery, which but a few years ago was a luxury to be had only by the few, has come to be of almost daily use with the many in its season, and should be found in every garden. It is grown as a second crop, succeeding spinach, lettuce, or other early crops. The White Plume and Paris Golden are the favorite early sorts, and the Giant Pascal for late. If no sash are used to start the plants, buy some from the seed-bed of your neighbor who has them, prepare a bed of suitable size, and prick them out two and a half inches apart, from the 1st to the 20th of May, according to whether they are wanted for early or late use, or the ground be free of the early crops. The frame for this bed may be of boards, as it is only necessary to have something to support the shutters or mats for shading, water freely, and shade them for a few hours each day till they are well rooted. In three or four weeks they will be ready for the field, where they should be set when three or four inches high. When setting them in the field draw a line, so as to have the rows perfectly straight; walk the line, and move it over for the next row ($4\frac{1}{2}$ or 5 feet); this will mark your row; then with a light iron-bar make the holes eight or ten inches apart and five or six inches deep, fill the holes with water, and set your plants, and they will all live, even if it don't rain for two weeks. This rule will apply to setting all plants after the ground has become dry enough to make watering necessary; do this and avoid the hard work and worse than useless expense of carrying water to the field to pour on the foliage or about the plant where it will never reach the roots.

We have been told this winter the nature of the disease known as black-rot on the tomato; we were not told the cause or the preventive. Practical experience teaches that the cause is drouth, and the preventive of course would be to supply the needed water; and while this is impracticable in field culture except where an irrigating plant is established, in the family garden, where there are only two or three dozen plants, it can very readily be accomplished by making a basin of the dirt around the plant and turning in water enough to thoroughly wet the roots. One such watering might save the crop.

Of the importance of the frequent stirring of the soil perhaps it is needless to speak, though the importance of this cannot be too often brought to mind.

The time for hoeing the different crops is a matter of considerable importance, as the different crops require different treatment. It is well known that beans should not be hoed when wet, and I think this applies to potatoes, tomatoes, and other plants whose foliage is of that rough soft nature, as the dirt clings to them worse, and is more likely to blast them; but cabbage, beets, lettuce, and others whose foliage is of a firm smooth texture, may be hoed when wet, and cabbages should be hoed at no other time.

27th February, A. D. 1896.

ESSAY

BY

EDWARD O. ORPET, South Lancaster, Mass.

Theme:—The Chrysanthemum.

With the march of a higher civilization there follows immediately in its train an irresistible love for the beautiful, a thirst after things that humanize human nature, and, whether it be sought in Music, Pictures, or Flowers, the desire is always the same for a something that will lift one up out of the every-day grind of business cares and give them something, it may be more or less intangible, but there is a satisfying reaction about pure enjoyment of this nature that adds years to men's lives, brings them into closer intimacy with nature and her wondrous plan, and never fails to make better citizens of the great Commonwealth.

As Horticulturists, we are told at times, as in the reconstruction of a tariff bill, that our products are to be classed under the head of luxuries, and as such should be taxed. I tell you that the sooner this idea is exploded that flowers are only for the few, and to be made hard to obtain, just so soon will one of the most potent factors of civilization be set free, and we shall not hear it said when a prominent man dies who has gotten together a fine collection of rare plants from all parts of the world that he lived a generation ahead of his time.

I travelled last summer through the most civilized part of the most civilized nation to-day, and what do you suppose struck me above all others at first sight? It was the cottage gardens of the masses all a blaze of color with the wealth of flowers, and nearly every tiny garden had its tinier greenhouse in one corner, where the good man who had returned from his daily toil could go and smoke his pipe, tend his potted plants, sow seeds, and study and enjoy nature in its highest development every day in the year. There is no hobby that one can

so well recommend to rich and poor alike as ours; it is as pure as the daylight, and as free to all as the sunshine itself.

The very subject of "Flowers" suggests to each of us at once those with which we are most familiar, or it may be such as we are most fond of. The Rose, Carnation, Violet and Chrysanthemum at once suggest themselves, but it is of the latter that I am to talk to you to-day. I may not be able to tell you anything new on the subject, but there are some things that are so true that they will bear repetition, and I come here to-day in the hope that there are some few facts connected with the ancient and modern history of the Chrysanthemum that will bear telling over again.

In the nomenclature of this class of plants we are familiar with the two great divisions that are popularly made for the sake of easy distinction as to form, namely, the Japanese and Chinese, the one regular and globular in outline, and the other fantastic often, but always informal. It is, I find, sometimes thought that there were two parents, one Chinese and one Japanese, from which each class was derived, but no doubt most of you are aware that there was but one common origin in C. Sinense most probably, this species being common in both countries, but has been most highly developed by the Japanese with their patience and persistence. It is a most difficult matter for the most expert critics to-day to decide to which of the two countries belongs the majority of the trees, shrubs and garden plants that we have received from the east, but it is pretty certain that much of that we credited to Japan has had its origin in China, but been adopted or introduced into the islands of Japan, where they have now all the appearance of being indigenous. It does not matter to us what the parent was, but it is of interest to know that all our garden Chrysanthemums owe their origin to the one species, C. Sinense, and that the many forms and varied types that we recognize to-day are but variations that have occurred under the skill of the cultivator. It is not more than four years ago that that great pioneer of Chrysanthemum culture in America (Jno. Thorpe) told us in Boston that he thought it would not be long before we should be able to raise varieties here as good as any that were imported from Japan; at that time he said it was not to be denied that the best were of Oriental origin. This is but a very short time since, but the prediction has proved true. for to-day there are no better varieties in commerce than Ivory, Major Bonnafon, Eugene Dailledouze, Mrs. Jerome Jones, Niveus, Philadelphia, and a host of others that might be named, all of American origin, and of course well adapted to our climate and method of culture. The

French raisers have long had a monopoly in this business of raising seedlings, and as long as they send us such as Vivi and Morel we shall be grateful to them; but to one of this stamp there are hundreds of little or no value for our climate, and it is well that we have come to rely upon American industry and brains to supply our wants, and incidentally those of Europe too. Last summer I took an extended tour through some of the best English gardens, and enjoyed comparing notes with the growers there as to the relative merits of our varieties in the two countries. There is a wide-spread feeling over there that most of our novelties are no good, and should never have been sent out. If we could export a little of our climate with the plants, there would be less of this sort of grumbling, and more of our sorts grown there. That it is the climate that is at fault I am fully convinced, for do not we have the same experience with kinds that are of European origin? Our summer sun is too hot, the wood is ripened too soon, or even if the flowers are fairly good they do not have the texture that is necessary in a good flower of the present day to enable it to stand up after it is cut with long stems. Taking these facts into consideration, it is well, I say, that we have good men to the front who have made it a business to supply us with free-born American Chrysanthemums, and those of the best quality, excelling those raised in all other climes, and if we stop to think how quickly this has been accomplished it will easily be seen that it is one of the marvels of latter-day Horticulture.

While on the subject of raising seedlings let me urge those of you who have the conveniences at hand to try a few seedlings each year if only for amusement. If necessary to start with, buy a few seeds this year and sow them in a warm greenhouse in April, and grow them on without check as you would rooted cuttings; it is most interesting to watch them show buds and to see the flowers as they develop their colors and gradually unfold their flowers. You may not get any that are worthy of honors at the hands of the National Society, but you will surely get pretty flowers, and they will be your own children. The better way then to continue the work is to take two of the best flowers of the kinds you wish to work upon, beginning when they are fully expanded in the fall, that is, when the eye in the centre is fully visible and the pollen ripe, shear off the petals of the seed-bearing flower, and apply the pollen from the other, and then carefully isolate the plant in a sunny corner of the greenhouse until the seeds are ripe; it will not take long, soon after New Year you will be able to harvest the seed until sowing-time, and you will then, if the parents

are carefully recorded, have pedigree Chrysanthemums, some of which will prove of merit. We are often led to think and say that the market is over-stocked now with kinds, and that there is no more room for others, and this is true in a measure of the white and yellow kinds, but there is still room for good pink and red Chrysanthemums. Florists to-day are still looking out for the pink that is good, bright, clear from shading, of good texture and foliage, and one that will pack and travel well. So you see there is still room at the top. Some of you may object that it is not a suitable occupation for the amateur; that professional growers are the only ones who have reaped either wealth or reputation on these lines. This may appear at first to be so, but let me tell you that the work of hybridizing is essentially that of the enthusiast, one who has time to devote to the study of one particular plant or genus of plants, and to make it his own, if necessary, to the exclusion of all others, and success will surely attend his efforts. It has been so through all the improvements in the different branches of Horticulture from time beyond count that the best work has been achieved by operators who had little convenience but lots of enthusiasm, and I could prove it to you, did time permit, that the best results in hybridization have emanated from the ranks of the non-professionals, though they may have later drifted into it as a business as a natural consequence. You see we professional gardeners and also the commercial florists have too many irons to keep hot to be able to give the necessary amount of care and attention to any one class of plants, and I know of no more interesting and profitable field for the amateur than the culture and improvement of the Chrysanthemum. Haphazard work should always be avoided; proceed with care, making careful records as the work goes on; always look out for the weaklings among seedlings, these containing ninety per cent. of those that will prove of value, and must be carefully nursed into vigor; those that are aggressive in the seed-pans from the first will prove to be the weeds of little value. There is a good deal more in this matter of seedlings than most people are aware. We used to grow a large number of Cinerarias for winter use, and our neighbors could not always understand why ours were generally the best strain; they came to the conclusion that the dealer had more than one strain under the same name, and then we had to tell them the reason of the difference; we always threw away all those that made the most vigorous start when it came to potting time, or, if the seed came up thickly, we pulled out the strongest and threw them out of the seed-box, carefully nursing on the weaker ones; in this way we preserved the choicest

colors and best flowers. It is well to remember always that the higher breeding lessens the vitality, often times in the seed, and almost always in the resulting plant, so take care of the weakest if you desire to have the best is a good motto to carry with you all the time when gardening.

There seems to be a growing tendency to consider the Chrysanthemum only as a flower for the professional florist to produce—one that the amateur is unable to handle, and at the same time get first class results from his efforts. Now, while it is true that the florist is necessarily a good grower of this Queen of Autumn, it by no means follows that any one who has the shelter necessary in fall to protect the plants from frost and damp cannot also enjoy his share of the good things that our Queen of Autumn has to dispense. It seems to me that there is no one flower so well adapted to the needs of the people, or one that will give so much pleasure at the dullest time of year for the amount of care bestowed on it, as the Chrysanthemum. The largest blooms are not the best always, neither are the huge specimens we see at exhibitions to be regarded as the acme of perfection for general use as decorative plants; to me they are interesting only as showing how far it is possible to develop a plant by high culture, disbudding and training. For general use and the most satisfaction give me good-sized flowers, grown even sometimes as sprays by taking out the leading bud and letting the others develop at their own sweet will, and a bunch of these loosely arranged in a vase will far exceed in artistic merit a number of huge blooms, many of which are too heavy to be supported by the stems There is another reason for this loss of enthusiasm among the smaller growers, and it is a more difficult one to do battle with. There was a time not long since when we could root a cutting, plant it out in the garden, and forget all about it until time to protect from frost in fall, and we used to get lots of bloom with a minimum of labor. All this is changed now, and the cause taken as a unit is a very small one, but taken collectively in the shape of an army of Chinch bugs it proves to be too much for the most skilful cultivator, and he takes his plants indoors, and keeps them there all summer, so that he can fumigate occasionally when the bugs have the importunity to invade the sanctum sanctorum, for they will come even into the greenhouse, and the result of their work is seen in the early forenoon by the tops of some of the shoots wilting when the sun gets high, a close examination will reveal the puncture and oozing out of the sap, and if you are cautious and approach the plant quietly, the enemy may soon be seen; he does

not readily take wing, but usually takes refuge in dropping suddenly when first discovered. If the hand be held underneath it is very easy to catch the mischief-maker, and we find he is very susceptible to a gentle pressure between the finger and thumb. As before noted, when the trouble occurs indoors it is comparatively easy to do battle with the smoke-pot on some cool evening. The fumes of tobacco are very distasteful to all insects; we prefer however to avoid burning the tobacco at all times if possible, and especially in the hot months, when the growth made is so soft and very liable to injury; it is also an unpleasant task to some people to whom the weed is objectionable. The better way when applying insecticides is at all times to use them as preventives rather than curatives, and it will be found that an occasional dusting of tobacco-dust will do the work better than smoking, especially if taken in time.

To those who would grow their plants outdoors there is one infallible guide. If you can grow a Dahlia in your garden you can also be certain of success with the Chrysanthemum. The bugs prefer the Dahlia where it is available always, and some growers plant Dahlias near their plants on purpose to act as a decoy, and much trouble is saved thereby; but I have noticed that in the vicinity of towns there is not nearly so much difficulty experienced from the Chinch bug as in the open country, and I may be giving you advice that is not needed, but to be forewarned is also good at times. For the past five years my employers have been asking me at intervals why it is they can't have Dahlias, and it is perplexing to have to keep on admitting that we are beaten each time we plant the roots, for between our place and the town near by there are cottage gardens that are famous for their splendid Dahlias every summer; they grow by the dusty roadside, and after a shower they are simply gorgeous, and I have been envious of them each year; and in another garden near by there is a clump of hardy Chrysanthemums that I have noticed year after year in the same place, defying winter storms and rains right into late November, on the sheltered side of a cottage. There are therefore reasons to suppose that the Chinch bug does not like city life, and you may be free from its ravages here in Worcester. I only hope it is so.

Speaking of hardy Chrysanthemums reminds me that there is of late more attention paid to this class, and dealers are adding them to their lists and trying to create a demand for them, and a most worthy motive is at the bottom of it, for, while there are comparatively few that can or will give the time and attention to the production of high class blooms, there are thousands that would if they knew plant this

race of late fall flowers to liven up the dull days of the first approach of winter. There is nothing difficult in their culture; if given a sheltered corner in rich soil, not too shady, and an annual top-dressing each year in early spring, they will take care of themselves afterwards. Of this hardy race the flowers mostly belong to the Pompon class, and, though not large, they are extremely pretty when grown in large masses, or when cut and arranged in vases indoors.

You will expect me to tell you something about the growing of large specimen plants, and also how to grow specimen blooms; and before going further let me tell you, gardeners and florists, that I have nothing to tell you that you do not know already. Chrysanthemum culture is better understood to-day than ever before, owing to the excellent literature we have on the subject; besides the periodicals that treat on the subject, and to those of you who have not already seen it I would strongly advise a perusal of the American Chrysanthemum Annual, now in its second year. It gets together just what is of interest from all sources on this particular subject, and will be invaluable as a work of reference in years to come. There is a prevalent opinion that it is impossible to over-feed such a strong-growing plant as the one under consideration, and I have seen it so stated by men who ought to know better than to give such advice. As a matter of fact there is no plant that will get dyspepsia quicker than the Chrysanthemum. Those who grow large quantities take care to separate the kinds, giving each such soil as experience has proved desirable. Some sorts will, as you all know, take a larger pot or more room on the bench than others; they are great growers, need rich food and plenty of water; others again are apt to get a yellowish tinge in the foliage and to droop in strong sunshine, a sure sign that there is something wrong at the roots, most likely over-feeding, either in the shape of too strong stimulants or a soil that is too rich to start with. For these delicate-rooting kinds we have found that the addition of some burnt earth from the smother heap or charcoal refuse is an admirable ingredient to mix in with the compost; it is not so much as a fertilizer, though there will be a small percentage of potash contained therein, but its action will be purely mechanical, as freeing the soil of a superabundance of moisture, and in this way æreating the soil so that there will be a healthy root-action, and all other desirable results will surely follow. Another plan, that is also good, is to make a saturated solution of lime, and after the water has become clear apply it to the plants once every two or three weeks; lime is a wonderful purifier, and the same may be used over again when more water has been poured over

it; you cannot get lime-water too strong, for water will only hold a certain quantity in suspension; it is also death to worms in the soil the first application; it is good for most pot plants, but be sure you do not give it to any of the ericaceous family; all these are very susceptible to lime in any form, even in the soil; the fine hair-like roots are killed directly they come into contact. Most of you have had experiences with the Trailing Arbutus and Laurel when trying to transplant them. There is no real difficulty anywhere in this vicinity, but in some sections neither of these loveliest of native plants are found growing wild, nor is it possible to introduce them, and it is all due to the presence of lime in some form or other in the geological formation of the locality; but, apart from Azaleas, Heaths, Rhododendrons, and such like greenhouse plants, there are very few but what are much benefited by applications of lime-water at intervals of say once a month, and Chrysanthemums as much as twice or three times during the season, even if the plants are doing well, and oftener if they are doing poorly.

Few of you will have the conveniences of benches to grow the plants in indoors as the large growers do, but there is another plan that we have adopted largely of recent years to obtain good decorative plants for indoor work, not too tall, with ample foliage, and perhaps one large flower, or if desired a cluster or spray of smaller blooms. For this purpose we take the kinds that are naturally dwarf growers, such as W. H. Lincoln, Ivory, Marie Hoste, John Shrimpton, Major Bonnafon, Maud Dean, and in fact all such as are of dwarf or medium height are selected and cuttings taken about the 1st of June, that is, two or three weeks later than the crop taken off and rooted to plant in benches, and these when rooted are potted on, and when well hardened off and established in the three-inch pots are shifted on into six-inch and potted hard to induce a short-jointed, sturdy well matured growth, not pinched back, and in the flowering time, you will have exhibition blooms on six-inch pots that you need not be ashamed to show in public; or, better still, they can be taken into the dwelling-house and used for decoration and they will last about three weeks in fine condition if placed in a cool place. We grow each year about three hundred in this way, and it saves cutting other bloom, and gives us an opportunity to make a bold display in the dwelling-house for about six weeks, or as long as the season lasts. Let me urge you all to try a few plants in this way next season, if only a dozen or two for trial, you will not regret the experiment, because the flowers last so much longer on the plant than when cut, and the colors can be as easily arranged for effect as when cut from the plants.

For the production of good plants and good flowers later, it is of the utmost importance that good soil be used, not necessarily over-rich, but such as you would use to grow Roses may be regarded as an ideal soil for the purpose, we have used for years past a soil that is naturally poor, but at the same time one that makes a good vehicle to hold whatever may be placed therein, the place we get it is considered a mighty poor pasture at the present day, but it is of that nature that never gets sour or inert, it takes water readily and does not hold too much in suspension, and also in preference to adding a large quantity of farmyard manure, we rely almost entirely upon bone meal and a little wood ashes to begin with, adding at the same time about one-fifth of burnt refuse, taking care to mix at least six weeks prior to putting it in the benches or pots. Bone meal directly it is added to the soil has to go through a chemical change before it is available for the roots of any plant, this process is a fermentation, and is dangerous to young root-fibres if any come in contact with it, there is also quite an appreciable amount of heat generated in the heap, often enough to kill insects and weed seeds, and we like all this to take place before we are ready to use the soil, and the same is then in the best possible condition for the young plants to take hold and grow away without check from the beginning. After the plants have taken hold well in this soil, we have to watch and see when a little stimulus is necessary, and when this is apparent, we begin to use the drainage from the cow barn, and it is wonderful how well this suits the Chrysanthemum, it is perfectly clear, that is to say, without sediment; is very strong in nitrogen. Prof. Brooks of Amherst tells me that in this drainage we have four-fifths of the manurial salts that are derived from the cow, it is a strong statement, but I am quite sure he is correct, to think that only one-fifth of the manurial value is contained in the solids themselves, the rest being all present in the liquids, easily saved, but alas, also easily lost. It is of great strength as we get it, and needs to be diluted down to about one-twelfth of its bulk in water, it is then perfectly safe and very beneficial to all plants grown in pots, or in the garden, when the buds are formed we have to use by way of change of diet, Sulphate of Ammonia and Nitrate of Soda, these three stimulants with the lime water make a very acceptable diet for the plants, furnishing the requisite change that is so essential both for man and plants. The analysis of the ash of Chrysanthemum plants shows that there are nine distinct elements present, five of which are present in large quantity. Lime is present in 26 per cent.; Phosphoric acid, 19 per cent.; Potash, 16 per cent.;

Soda, 10 per cent.; and Magnesia, 10 per cent.; so that we are enabled to know what to apply to make up the deficiency caused by the drain on the soil by the plants in search of these five elements. We see that Potash and Phosphoric acid are not present in larger quantities than in most other plants, but that Soda, Magnesia, and Lime are greatly in excess. It will be found, however, that by following a change of diet, as before noted, that there will be a sustained vigor, a well-ripened growth, and in consequence, good flowers of bright colors. It is always wise to discontinue the application of stimulants as soon as the flower-buds begin to unfold, for unless it is discontinued there will be danger of decay in the half-opened blooms, and also a tendency to pale-colored or abnormal blooms. I have often been asked which bud is the best one to select when taking one for the purpose of having exhibition flowers. This is a large question, and can only be decided exhaustively by each cultivator for himself in his locality, for his special needs, and with the varieties under cultivation. To illustrate my meaning, it is not safe to take buds before the middle of August, but after that time, it is, we find, good practice to get the first that comes along, and at the beginning of September the plants will require daily watching to see that none escape us. These first buds will be those termed crown buds, and we find that if the largest flowers are desired, this is the one to secure to obtain that result, but the flowers produced are at times out of character altogether; take Vivi and Morel on the crown bud, and it will be a very pale washy pink, but wait and take the next bud, call it second crown or terminal, whichever you like, and the result will be a flower of smaller size and characteristic of that variety. This same peculiarity is also noticed with Ada Spaulding, one of the prettiest Chrysanthemums we have when taken on the terminal or final bud. Then there is Ivory, well known to you all, that is always best on the first bud you can secure, and in fact, if I am to be permitted to offer opinion, though it may differ considerably from that of others, it is always to take the crown bud on short, dwarf-growing varieties if exhibition flowers are wanted, and if this is not the issue, then wait and take the next that comes and be satisfied with flowers that are perhaps smaller, but normal in coloring. We have got to sacrifice something in either case, especially if we are not familiar with the peculiarities of each kind to start with, but after growing them for a season we can form a pretty accurate idea which is best treatment for each variety, always making notes on the results as they are demonstrated, especially as to the height the plants grow, so as to get them arranged accordingly

another year, this is especially desirable when bench culture of many kinds is adopted, or new ones are on trial. Last winter I made the suggestion to one of, if not the largest growers in this country that he would when sending out new kinds, state the height they grew, the bud to take, and season of bloom; in this way he would make his list a veritable guide to Chrysanthemum culture, and it would be in the hands of the cultivator at all seasons. I am glad to say that the suggestion was taken up and has been adopted I hope permanently, not only with the new kinds but with older ones that we are anxious to try also. Disseminators of new varieties have in the past thought it enough if they got together a few sets of new kinds and offered them for sale, and that we ought to do the rest in the shape of paying high prices for the whole set only to find that if there were one good one it was great results; we had to do the testing and weeding out, and also find out what were the characteristics of the plants besides the colors; this detail was the only one they condescended to supply. All this is now a thing of the past, and we wonder now that it was submitted to so long. There is now in every large centre a committee appointed by the National Society and part of the same, with full authority to pass opinion upon new ones during the flowering season, a standard of rules are drawn up and points named by which they are to be judged, and now it takes a really good flower to pass muster and come out with honors. All this is a distinct step in advance over old methods, and all in favor of the purchaser, for he knows that if a new variety is offered with a certificate attached to it it means something, it means that at least three good judges are of the opinion that this particular variety is a distinct gain to our already long list of garden varieties, and also that their reputations as experts are also at stake at the same time; so I say welcome to the good work that the National Society is doing for us without money and without price; and if the standard of excellence has been placed rather high as some seem to think, let us reply that there are no kinds in commerce so good that they cannot be equalled; we want a few more good pink sorts such as V. Morel for early and late season kinds, and a good late white equal to Niveus would find a place, so also would an early yellow to equal Bonnafon, and some more good crimsons that would not burn; John Shrimpton is the only one we have besides Cullingfordi that will stand the sun without flinching.

Now a word as to specimen plants in pots. I may say first that we do not grow them now; they are real white elephants to the gardener who has to supply large quantities of flowers and plants all

through summer and winter. There is too much space occupied just at the time we are storing our winter-blooming plants, and also in summer, now that it is necessary to grow them indoors all the season, so we have to make arrangements to supply the aching void left after the cut blooms are all gone by bringing on other plants in the space that would be otherwise occupied by specimen Chrysanthemums. But these are requisite and indeed essential to make up a good exhibition, and where one has the time at disposal as well as the space it is an interesting hobby, and is one that will give lots of pleasure to the grower. It is essential you will find in the beginning to select with care the kinds to grow for this purpose; very few of those adapted to producing large blooms are suitable for bush plants, and this is the reason we see so much duplication at exhibitions; for white, Ivory, Jos. H. White and L. Canning are good; for pink, Louis Boehmer and all its sports, V. Morel, Iora and Eda Prass; and for yellow, W. H. Lincoln has no equal, and also Golden Ball and Clinton Chalfant; while for reds, G. W. Childs is a reliable one. Cuttings to produce plants for this purpose should be inserted early in the year to get a good start and to build up as good a foundation as possible before the middle of August, for on this depends the size of the plant, and after that time it will take from the size and number of the flowers to pinch the plants later. Secure good strong cuttings, and when rooted grow them on without the least check, shifting on from one size pot to another as may be necessary until in May all are in the flowering size, and then the rapid growth must be carefully pinched in as soon as two joints of new growth are made, but be sure never to pinch at potting time, rather wait until the roots have gotten over the check; it is too much to disturb the roots and pinch off the tops at the same time. A good spraying every evening is a great help to the plants, and stimulates them after the heat of the summer days; it is also highly essential to keep from insects. As soon as the plants have become well established in the flowering pots stimulants must be applied as before noted, taking care not to use them too strong, but to err on the weak side rather than on the other; the pots too should be away from direct sunshine, either plunged in the garden or, if in the greenhouse, mossed round so as to keep the pots from direct sun, these being capital conductors of heat, and the roots will soon suffer, especially those in contact with the pots. Be sure at housing time in fall to give plenty of air at all times when the weather is favorable; it is far best to use a little artificial heat at night and leave air on than to close up the house on cool nights; mildew is sure to result; also damping of

the blooms after we have been to so much trouble to produce them. If mildew does occur use grape-dust or some other preparation with a sulphur basis, but grape-dust is very easily disseminated in the atmosphere owing to its relatively light consistency, and is sure to kill all germs of fungus present in the house.

I have tried in this paper to cover in a general way as many of the points in connection with the culture of our favorite flower as possible, minute detail is not desirable, as it is well understood by all present, but if there is anything neglected that you wish to be made clearer it is my province to do so to the best of my ability. I have only the welfare of this Queen of Autumn at heart ever since I grew the first plants in my own little garden nearly thirty years ago, and well do I remember the way the plants were lifted almost daily to see how much progress was made at the roots as well as at the tops. Even the names of some of the varieties come back to me now.

5th March, A. D. 1896.

ESSAY

BY

DR. GEORGE E. FRANCIS,

PRESIDENT WORCESTER MYCOLOGICAL CLUB.

Theme:—A Talk on Mycology.

Illustrated by Stereopticon.

THE subject announced for this occasion accurately describes the paper to which I ask your attention. In a "Talk on Mycology" it is practicable to treat of any branch of the subject which may offer interesting features, while you will not expect a vain attempt at a general survey of that enormous division of the science of botany which has to do with fungi. Such a general survey you may easily get in any good cyclopedia, and particularly in the last edition of the Encyclopedia Britannica.

I have thought that this audience might like to hear a little about the life and nature of fungi in general; and rather more about those larger representatives which we call Mushrooms and Toadstools, and about the conspicuous varieties which we may expect to find in this vicinity, and their good and bad qualities. And finally, it is my desire to show some relations which the larger fungi have to practical horticulture, but not to discuss at any length the effects of moulds and blights, concerning which you have already been told in the able paper by Prof. Stone.

Fungi are plants; they belong to that great division of the vegetable kingdom which does not bear flowers. Furthermore, fungi have no green leaves, or anything corresponding to green leaves: in fact they have no chlorophyll, which is the foundation of verdure; and no starch, which makes most other vegetable structures valuable for food.

Because they are not provided with chlorophyll, fungi cannot obtain carbon from the atmosphere like all plants which have green

leaves; the great, the only, source of carbon, which is a most important component of all plants, is in the carbonic acid gas in the air. The chlorophyll cells under the influence of sunlight, split up this carbonic acid into carbon and oxygen; the latter passes back into the atmosphere through the pores of the leaves, while the carbon is retained and distributed by the sap throughout the plant or tree. But fungi certainly contain carbon; how do they get it? They obtain their carbon from plants that possess green leaves and chlorophyll; they are either parasitic on living organisms, or they get their nourishment from decaying animal or vegetable matter. Every fungus is either a parasite or a saprophyte; the latter term signifying that which lives on decaying organic matter. Most of the minute, the microscopic, fungi are parasites; most of the larger mushrooms and toadstools are saprophytes, although certain of them are always parasitic, and others sometimes so.

I have just used the phrase "mushrooms and toadstools," and I must stop a moment to explain that the two words mean practically the same thing, when the subject of fungi is looked at in any broad way. There is a species of fungus, the Agaricus campestris, which is often grown in cellars and dark places in greenhouses, to be sold at high prices to epicures; the same sort is to be found in pastures in the autumn; now, to one who grows them, this sort only is a mushroom, all others, more or less resembling them, are toadstools. On the other hand there are some experts before me who used to gather specimens of twenty-five or thirty species, last summer, and to eat them with relish and delight; these initiated ones did not call their favorites toadstools; certainly not. The word toadstool implies a certain contempt, and practically no other definite meaning; and as I have no contempt for any of the family, I shall speak of them all as fungi or as mushrooms.

The structure of a mushroom when viewed under a microscope, is very simple; if a thin slice from the trunk of a tree is moderately magnified, there is found to be a good deal of variety in the shape, size and arrangement of the minute cells of which it is composed; but in a corresponding portion of a mushroom, we find only simple thin-walled cells, round where they are not made flat sided by the mutual pressure. I said, a corresponding part; and it must be explained that the stem of what we call a mushroom is not the stem of the plant, but of the flower; the plant is underground, and looks like a simple mass of roots. That which comes up in a night and withers in a day or two, is the spore-bearing portion, and is evanescent

in most cases; while the underground portion called the mycelium certainly is more permanent, and may endure for many years, never attracting notice save rarely, when in digging up an old lawn the multitude of white roots or fine threads may attract attention.

One further strange feature must not be passed over; that in the production of the spores of the more conspicuous fungi, which I call mushrooms, there is no evidence of sexuality. In almost all flowering plants, as we well know, the pollen must reach the pistil, in order that seeds may be produced; and the wonderful devices by which this union is secured have attracted the attention of many profound students of nature, and have stirred to awe and admiration all who have been so fortunate as to read about them in the writings of Darwin, or to hear such lectures as Gibson has given.

The reproduction of plants by parthenogenesis, without pollen, has been proven in the case of a rather common plant, very similar to our life-everlasting; and it seems to be universal among the conspicuous fungi, but in the smaller sorts, moulds and bacteria, etc., the sexual function again assumes its place.

The larger species of fungi are classified on systems largely based upon their spores, and the manner in which the spores are produced. The first great divisions are:

1. Fungi whose spores are produced in the interior.
2. Fungi whose spores are produced on upper or exterior surface of cap.
3. Fungi whose spores are produced on lower surface of cap.

In the first of these great divisions are found the puff balls; of which some have white and some have purple flesh, in the early growing state. Here are three varieties which may be met with about here, the largest is rarely found above 6 inches in diameter but a little farther south it has reached 20 inches in diameter. When cut across, at the eatable stage, that is to say, as soon as it is developed, the flesh is soft, quite homogeneous, and beautifully white and clean. Later it becomes discolored, yellowish brown, cottony and dusty. The smaller sorts go through a similar change; at first white and more or less edible, they rapidly dry, until when crushed between the fingers they emit a puff of smoke. Other puff balls have dark flesh from the start, like the sclerodermas, and are not fit for food. These varieties are common; spiny or warty without, very dark purple within.

In the next great division, the spores are produced on the upper surface, and the representative genus with us is the morchella or

morel. There are several species differing in outline, but all closely resembling the type, and easily to be recognized by the honeycombed exterior. So far as I know, all the species are excellent eating; they are not very common, and are found in early summer.

The rather common and abominable stink horn, Phallus impudicus, is a not distant relative; and in this connection comes also the very striking and bad smelling Clathrus carcellatus, which is most unlike any other in shape; is of a brilliant red color; very attractive to the eye, but most objectionable to the sense of smell.

In the third great division are found most of the edible and conspicuous fungi; and they produce their spores on the under surface of the cap, which is an almost universal feature. In most kinds the spores are borne on thin plates called gills, which radiate from the stem; these are the great family called Agarics.

Another family, less extensive, has the spores produced in tubes in the under surface of the cap; these are Polyporeæ; and finally there is another small, but very distinct tribe, in which small spines, on the under surface of the cap, bear the spores.

These three divisions, having respectively gills, tubes, and spines, will be glanced at in turn. And first, the great and most important family of Agarics. The color of the spores is one of the grand landmarks, so to speak, among the Agarics; and great groups are found to be marked off, by having respectively spores black or very nearly so; spores pink or ochraceous; and spores white.

The typical mushroom of the markets and kitchen is not difficult to become acquainted with. In spite of great variation in its size, color, and many minor points, it always has dark spores, pink gills which turn black or brown, a little veil on the stem, which will be later referred to, and an agreeable taste and odor. It is usually found in open pastures in autumn. I have myself found a closely related species to be much more common in this vicinity.

The agaricus cretaceus is more chalky in its aspect; the pink of the gills less pronounced, and the flavor less delicate.

There are other species of agaricus to be found, all more or less edible; they are not altogether easy to distinguish from one another, as each species is liable to vary a good deal from it usual type, in such matters as size and color. But the generic, important characters are always to be found.

Another very common family with black spores is the Hypholoma group, which are very sure to be found where there is decaying wood. The commonest perhaps is that called "Brick top" from its color.

Among the very latest specimens to be found, after winter has stopped all vegetation, are sure to be some large, dry, cracked and almost purple samples of this sort. The Hypholomas can be safely eaten, but are not generally liked.

The next group, with inky black spores, is the Coprinus family, well known about Worcester, where for several years there has been an abundant autumnal crop of the Shaggy Mane mushroom, Coprinus Comatus. This appears year after year in the same localities, and cannot be mistaken for anything else. Its smaller relatives have to be hunted for, and are usually not far away from the Shaggy Mane. These are all perfectly safe to eat if fresh, and there is no hurtful variety that can be mistaken for them.

In the class having pink or ochraceous spores there are no species which need detain us now, and I pass to the Leucosporæ or white-spored division of the Agaricus, and among them we shall find only too many kinds which deserve our attention, and as time is limited I shall allude only briefly to a few of the most conspicuous and important representatives. One of our finest mushrooms, alas too rare, is the Lepiota procera or parasol mushroom. This seems to combine all qualities which can be asked for in an edible mushroom. It is very conspicuous by the elegance of its outline, its considerable size, its lovely soft, tawny color with brownish scales; its flesh is white, its taste and odor of the finest; and, finally there is no hurtful mushroom which can be mistaken for it.

The Elm-tree mushroom is by no means rare. Young specimens of this sort are excellent for the table.

The Lactarius deliciciosus is found in moist pine woods and mossy swamps, but is rare. Its general hue is orange; its particular character being that drops of orange-colored juice exude from the bruised or broken gills.

The Russula family is quite common and possesses many especially attractive representatives in this State. This species is quite peculiar in its color, which is distinctly green, and so, naturally alarming to the novice but it is certainly quite harmless, and as a food is certainly desirable, although its flavor is not quite as delicate as some sorts I have named.

Another very conspicuous Russula, Emetica, is very decidedly to be omitted from the basket when we are collecting for the table. It is very bright in color, varying from pink to scarlet. A simple test applies to all the Russulas,—break the cap and apply to the tongue; all the hurtful sorts will taste hot like pepper, not at once, perhaps, but in a few minutes.

One of my especial favorites comes among the white-spored division. It is the fairy-ring mushroom, Marasmius oreades. It is found all the summer through in open, grassy places; you may find it in all our parks, and in many lawns, as well as in pastures which are not too dry. But you will not always find it growing in an unbroken geometrical circle, although that is certainly the tendency and the rule in its growth. Starting from a simgle plant, the mycelium pushes out for food; when this food is consumed the fungus fails to grow; therefore the mushroom is only found on the outer edge of a circle, which will be broken as a rule, because there was not everywhere a full supply of decaying vegetation for food, and so the mycelium did not advance. The most marked peculiarity is the rather tough texture of the surface, like a kid glove. They are easily kept after careful drying, and when moistened become soft again.

In the same localities are sometimes found two other species of Marasmius, which are much like the fairy-ring, but not very attractive as food. A little study in the books of Palmer or Gibson will show how to distinguish them unfailingly. And here, perhaps, is as good a place as any to emphasize the fact that mushrooms must be learned, as individual species, by actual study of living specimens well vouched for, or of accurate colored plates, such as are now to be found in this Library and in the Free Public Library; or of colored models, of which a good collection is to be seen in the Library of Clark University. There are very few general rules, or specific tests, as of color, taste or shape. Each kind must be learned separately; it is not at all difficult as regards the common sorts, and in a very few weeks one can learn to distinguish surely the thirty or more really edible sorts to be found near by, and the half-dozen really poisonous kinds which must be avoided.

I pass now to glance for a moment at the important group of mushrooms, whose spores are produced in tubes on the under surface of the cap. And of these the most interesting genus is the Boletus.

In the Polyporus genus, the spore-bearing tubes are from the beginning, or soon become, much harder than the Boleti, and the whole fungus is inclined to be woody like the tree on which it generally is found. The commonest species is found on birch trees and is well known to you all. The young caps of the Polyporus sulphureus, an edible species, gathered when the tubes are beginning to form, are very good.

Another highly approved mushroom is nearly related, Fistulina hepatica. This is shaped and colored like a liver; on the top it is

roughened; it has various popular names, as Beefsteak fungus, Ox tongue, etc. This species, like most of those which grow upon trees, is attached at the side, having no central stem. This mushroom has even a closer resemblanee than others to meat, both in appearance and taste.

A final small group I stated to carry its spores on spines projecting from the under surface of the cap—Hydnum repandum, or Hedgehog mushroom. This is not rare, and when slowly and thoroughly cooked is said to be excellent eating, and to taste a little like oysters.

I purposely passed over, in its proper place, a very important division of mushrooms which bear white spores on gills, that I might emphasize to the best of my ability some facts which must not be forgotten or overlooked by all who attempt to collect mushrooms for any purpose. The *Amanitas* are common in our woods, and very conspicuous by their size and color. They are for the most part quite inoffensive to smell and tase, but the majority of them are deadly poison. They are probably the only really dangerous mushrooms we are likely to meet; and I desire to present a short sketch of their development and I hope to be able to fix in your memories the essential characters.

My starting point is the underground plant, the mycelium; of course this originated from a spore, but that process has not yet been followed. Little knots on the white fibres of the mycelium grow larger and pear shaped, and at last are raised above the surface of the ground. Each of these is to become a mushroom, and when cut through, the undeveloped parts are easily to be distinguished. We notice at the bottom a bulbous swelling, the stem rising from it bearing the cap and the gills. But further we observe an enveloping membrane fixed at the base and covering the cap. As the stem lengthens this envelope or veil is torn; part clings to the bulbous base, and part to the cap. This is called the volva, and its remains are to be detected in the full grown amanita, and, taken with one or two other characters serve to identify the deadly genus. The slide shows another little veil on the stem; this has its origin in a membrane connecting the edge of the folded cap with the stem; as the cap expands the membrane is torn, and only a ring about the stem is left.

If you remember that every mushroom having white spores on gills, a little volva or veil on the stem, and the remains of a general volva at its base is an amanita, I can promise that your investigation of fungi will not lead you into serious peril.

The volva at the base is usually described and pictured as if it were

a socket or cup from which the stem can be readily removed; sometimes it is so; but often is quite adherent or becomes part of the stem.

In the spring or early summer the Amanita verna is among the first to attract attention in the woods. Later, come other species up to the season of frosts.

Not all Amanitas contain the alkaloid which is so fatal; it seems quite clear that a few species are quite harmless; but it is a safe rule, indeed the only safe rule for beginners, to shun all mushrooms which have the remains of a socket or sheath at the base, a little veil or ring on the stem, and white spores.

Now why is it that these Amanitas are so dangerous? While, as I have said, the substance of mushrooms is made up of simple minute cells crowded together, when viewed chemically it is chiefly composed of a form of cellulose, in which the proportion of nitrogen is so large as to make it resemble flesh more closely than most vegetable tissue. I imagine that it is not far out of the way to say that the *substance* of all mushrooms is good food; it is the added qualities of hardness, of acridity, or pungency, etc., which make them objectionable, just as the special flavors of certain varieties make them particularly delicious and desirable. But besides those added qualities which may be moderately obnoxious to the digestion, there is developed in a few specious a narcotic alkaloid, commonly called Amanitine, because, so far as we know, it is only found in some of the Amanitas. The fact that Amanitas are the only deadly mushrooms has been brought most prominently before the American public by Mr. Julius A. Palmer, who also edited a beautiful, accurate and most useful set of colored plates of the mushrooms of America. I find, however, that Mrs. Hussey made the same statement in her magnificent work on the English fungi, published forty-nine years ago. Speaking of the Fly Amanita she says. "The poison it contains is that principle called Amanitine, which is not dissipated by cooking, and is the poisonous principle of Agarics (gilled mushrooms); other mischiefs arise from acrimony or mere indigestibility and are quite secondary."

Allow me here to express my indebtedness to the works of Mrs. Hussey, of Mr. Palmer, and of Mr. Gibson, from whose plates very many of my slides have been copied.

In England and America but one species of fungus out of the many thousand kinds has been cultivated and that is the Agaricus campestris. There are many varieties in cultivation, but all belong to the same species, it is believed. On the continent of Europe and in Japan a few other species have long been artificially produced. Whether we

should not find still other species at least equally suited to horticulture, no one knows; it may almost be said, no one has tried to find out. The old kind is grown in almost the same manner as by past generations. It is far from my purpose, as it is from my ability, to treat at length on mushroom culture. But a few facts may interest you. The essentials are:—equable warmth, moist air, soil heavily charged with nitrogenous matter, *i. e.*, manure; and finally the mushroom plant. Experience has taught how to secure the first of these essentials, and that they are found at least expense in caves and cellars, or other dark, close places; and luckily experience has also pointed the way to obtain and preserve the stock, for there is a curious and unexpected difficulty to be overcome. The seed of every fungus is the spore; but while spores are easy to obtain in their season, no one has yet shown how to grow a mushroom from a spore; I mean a mushroom really *good* for food. The Armillaria mellea, which can be eaten, but hardly with joy, has been produced by sowing the spores on the juice of plums, and has been cultivated to full development.

But not so with the market mushroom. Plant these spores as you will, nothing results. Someone, generations ago, found that the white roots, the mycelium of this Agaricus, can be transplanted, and by drying can be safely kept for months ready to grow and produce a crop when heat, moisture and food are supplied; and all cultivated mushrooms grow from spawn, which is the dried mycelium, raised and prepared by specialists who have their trade secrets.

It is believed by some that the spores of these mushrooms gain the power of growth and development in passing through the alimentary canal of an herbivorous animal. Horses, cattle, and sheep are very fond of these fungi; and old pastures are the best hunting-grounds for many of the best sorts.

I shall not take time to speak of the destruction of growing plants and fruit by the microscopic fungi; that topic has already been elaborately discussed before you. But let me, in passing, call your attention to the undoubted fact that if certain minute fungi are woful pests to the market gardener and the florist, yet others are also the direct cause of far out-weighing benefits, in bringing into a useful and manageable state all dead vegetable matter. The manure heap is simply a laboratory in which fungi reduce hard woody tissues to a soft, friable, soluble state, which can serve as food for growing crops.

I wish to call your attention to some features of the life of one of our very common mushrooms; Armillaria mellea, in the older books

called Agaricus melleus, the honey mushroom. This is an especially variable species, that is to say, while it always presents certain important features, as that its spores are white, its gills attached to the stem, etc., yet in such respects as size and color, shape of stem and of cap, scaliness of surface, etc., it varies enormously, so that two varieties of this one species may be as unlike to the casual or even somewhat educated glance, as if they belonged to two different genera. But in all its forms it gets its living from woody tissue, and is very apt to be found where there is a decaying stump or log. For this statement you are quite prepared, but it was certainly a great surprise to me to learn how great and general a pest this harmless looking toadstool is in our forests. It makes its way into a living tree, rots the wood so as to spoil the timber and finally quite kills the tree. Meanwhile there is nothing to show the casual observer what is at the bottom of the mischief. How does this come about?

The mycelium or plant of the honey mushroom is like a network of branching root-like fibres underground. At the apex of a mycelial branch the cells possess the power of secreting a ferment, and if this apex in its growth underground meets the root of a tree this ferment softens the outer cells of the root so that the fungus can penetrate it. Once inside it finds abundant nourishment in the sap, and it grows and extends; it finds its way into the softer and more succulent parts of the tree between the bark and the hard wood, and in that region extends without restraint. It absorbs to itself, not only the food which the tree prepares for its own growth, but the very tissues of the tree itself, which usually dies within a year from the first entrance of the fungus. Meanwhile the fungus growth, however extensive, shows few of the characteristics of a mushroom; you may find either broad white ribbon-like masses under the bark, or dark brown bands of mycelium about the trunk. No mushrooms are to be seen, except perhaps a few at point of junction of roots and trunk. It is only after long and most difficult investigation that it has been shown that what had been thought to be a distinct form of vegetation is only the overfed and sterile mycelium of the Armillaria mellea, and that in this way the common honey mushroom is a serious enemy in the culture of forest trees.

We see then that fungi, the larger as well as the microscopic ones, are seriously destructive to living vegetation, but it by no means follows that therefore fungi are foes to vegetation in general. For in the first place consider what becomes of the tree which the honey mushroom has killed. It is at once, almost in its entirety, added to

the soil, in the condition which is most favorable for the support of other plants. Nothing has been lost, but the elements assume another shape. It is conceivable, but I do not know that there is any evidence, that only those trees and plants which have a vitality below the average, can be penetrated by the fungi; if this be true, then the destruction of the weaker tends to a gradual improvement of the race.

But something of an entirely novel character has quite recently been observed, and demonstrated, which throws fresh light on the relations between fungi and green-leaved plants. It is no less than a systematic partnership, for mutual profit, between these two very diverse families of organic nature. It is highly probable that the outcome of further investigation will be of very great value to practical horticulture.

I have found the best account of these facts, as far as known, in the beautiful work on the Natural History of Plants, by Kerner, Professor of Botany in the great University of Vienna. A translation in four volumes, by Prof. Oliver, is in the Library of this Society, and from it I give a condensed quotation, describing the partnership of the two orders of vegetation.

"The division of labor consists in the fungus mycelium providing the green-leaved plant with water and food-stuffs from the ground, while receiving in return from its partner such organic compounds as have been produced in the green leaves.

The union of the two partners always takes place underground, the absorbent roots of the green-leaved plant being woven over by the filaments of a mycelium. * * * Here and there the hyphæ of the mycelium insinuate themselves inside the walls of the root's epidermal cells and the latter are permeated by an extremely fine small-meshed mycelial net. Externally the mycelium forms a mantle of branching fine cells, which look like root hairs and perform their functions. The exterior cells of the real root being covered by the fungus, cannot absorb as they ought to do, and relegate the business of sucking in liquid from the ground to the mycelium.

Thus the fungus not only inflicts no injury on the green-leaved plant by entering into connection with its roots, but confers a positive benefit, and it is even questionable whether a number of green-leaved plants could flourish at all without the assistance of mycelia. Every gardener knows that attempts to rear many species of plants in ordinary garden soil are not attended with uniform success. Therefore, soil consisting of vegetable mould from the top layer of earth

in woods or from a heath, is chosen for the culture of Heaths and Rhododendrons. But it is not every kind of forest or heath mould that can be made use of. When earth of that nature has been quite dry for a long time it is no longer fit for this purpose. It is known that such plants should be transplanted from their forest home with the soil still clinging to the roots; the roots should not be exposed and should be cut as little as possible. By drying the soil the mycelium is killed; by shaking off the soil, or by trimming the roots, the mycelium is removed.

The failure of all attempts to propagate the oak, beech, heath, rhododendron, wintergreen, broom, or spurge laurel, by slips or cuttings set in pure sand, is explained in the same way. Roses, ivy and pinks, the roots of which possess no mycelial mantle, are easily grown from slips in pure sand. But though the cuttings of oak, etc., strike root, they do not progress in their development, because the superficial cells of their rootlets have not the power of absorbing food when not associated with a mycelium. It is only when the slips are put into sand having a liberal mixture of *fresh* leaf or heath mould, that any plants can be reared. Various experiments are reported which all confirm the theory that the fungus mycelium is not only useful but necessary to the growth of many flowering plants.

In return for its important services, the fungus undoubtedly receives a full equivalent, in the form of substances helpful to its growth which have been formed by the sunlight in the green leaves.

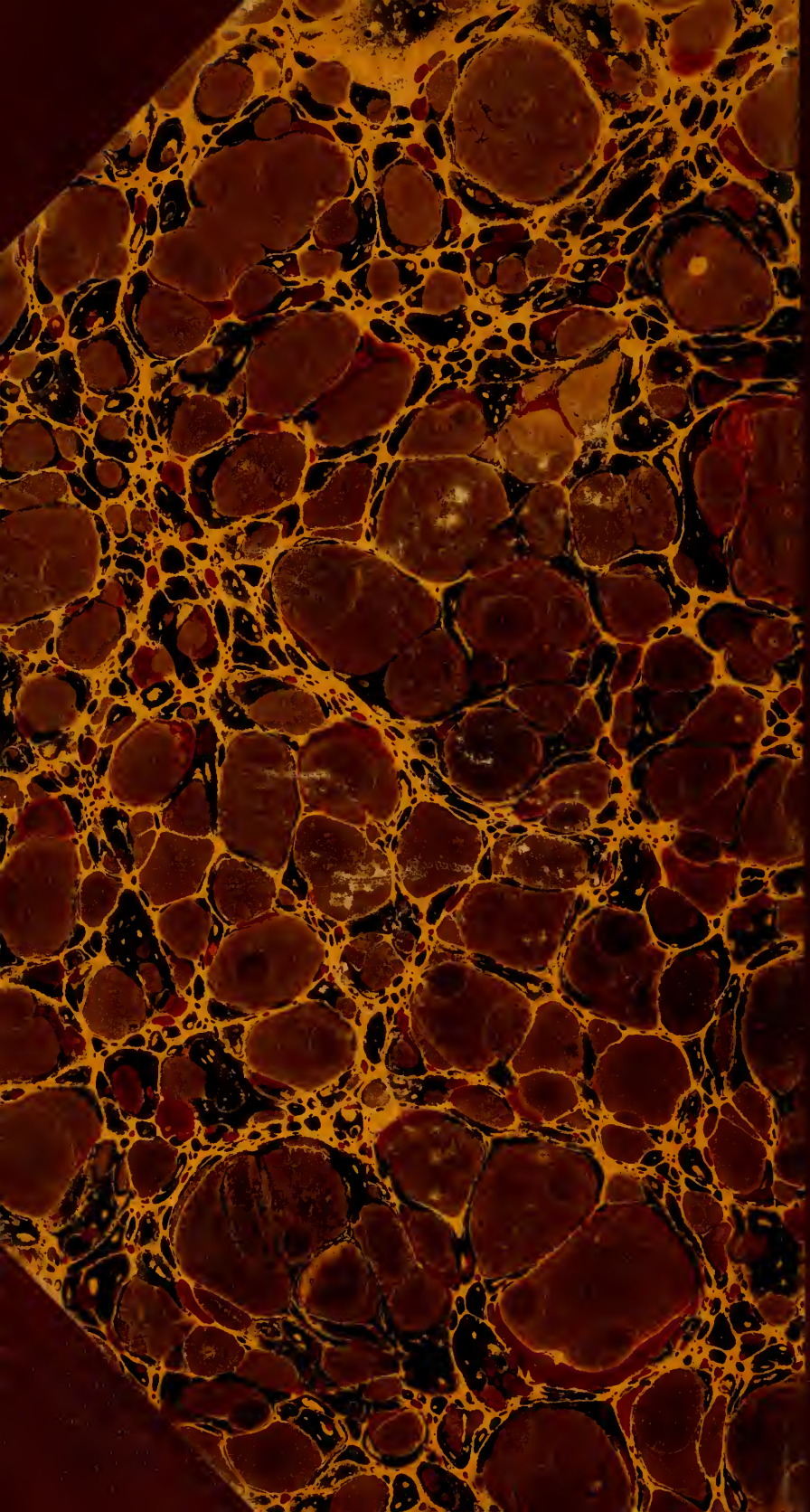
The range of species which live in a social union such as is here described is certainly very large. Besides many shrubby plants of the heath, arbutus and wintergreen families and the rhododendrons and daphnes, there are a large number of the conifers and apparently all the cupuliferæ, as well as several willows and poplars which are dependent for nutrition on the assistance of mycelia.

The green-leaved plants which are forced to be partners in this strange alliance are notably of gregarious growth, and cover whole tracts of country, forming boundless heaths, as in many parts of the British Isles, and measureless forests everywhere, as of oak, beech, fir, and poplar."

A very curious alliance exists between the Monotropa, the common Indian Pipe of moist woods, and a fungus mycelium. The Indian Pipe has no roots of its own, and absorbs all its nourishment from the cells of a mycelium. But the Indian Pipe has no chlorophyll, and so far as we yet know, gives back nothing to the fungus which helps it to live. A partnership with all the advantages on one side,

perhaps. We do not yet know all the facts; what little is known has been discovered very recently indeed.

Within a few days I came across this extract from a Bulletin of the Royal Botanic Garden (probably Kew). Referring to the established fact that ants are found essential to the healthy growth of some orchids, Mr. J. H. Hart states that they probably carry to the roots of the orchid the mycelium of a fungus which enables them to take up food otherwise unattainable.

Such facts as these of course are largely in the province of the professional botanists, indeed of specialists in that great science, and amateurs, however enthusiastic, are perhaps not likely to add much to human knowledge in this direction. And yet I am not sure of this; there may be important relations of the kind I have just described quite within reach of the observant faculties of many in this audience. But not without work, and time, and abundant patience.

I trust that this too hasty review of a most extensive subject has not been without its interest for you, and I hope that you will carry away something more than some bits of miscellaneous information. I should be very glad to feel that I had led some to see that this interest in mushrooms which has so recently grown up is something more than a passing fad. It is an introduction to a new realm in nature, under conditions which require some study and careful observation. We cannot safely gather mushrooms for our table without a knowledge of the species we bring home; not a vague general idea regarding them, but knowledge at least as discriminating as that which ought to be held by one who gathers autumn leaves, and does not care to run the risks of the poison ivy and dogwood.